FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

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The Future of Malta

LORD SWINTON, the Secretary of State for Air, let in some interesting light on the future of Malta in a recent debate in the House of Lords. Lord Strickland was urging his plans for making Malta a great base for seaplanes, both commercial and Service, and he drew from Lord Swinton the two admissions that probably the squadron of R.A.F. flying boats now stationed at Calafrana would be replaced by a squadron of landplanes, and also that it was almost a certainty that when Malta became one of the ports of call on the great Imperial air routes (as he hoped that it would before long) it was almost a certainty that the aeroplanes used on that route would be landplanes and not seaplanes.

Both these statements are rather surprising. No. 202 (Flying Boat) Squadron has been stationed at Calafrana for years past, and for most of that time it has been temporarily equipped with Fairey floatplanes. With these craft it has done very good work in making flights across and round the Mediterranean, exploring that sea from the airman's point of view, which is necessarily somewhat different from the view of the seaman. Only quite recently it has had its floatplanes replaced by Supermarine Scapa flying boats, which have endowed the squadron with greater powers, and seemed to usher in for it a new era of increased usefulness. To learn that it is to be moved away from Malta and replaced by a squadron of landplanes is certainly surprising. Seaplanes and an island seem to go together.

The members of the squadron will probably receive the news without undue grief. Malta is a very pleasant spot, but it is small, and it is not Home. Not long ago it was decided to bring No. 202 F.B.S. back to England and to replace it at Malta with another squadron, but for some technical reason the relief was abandoned. Whether No. 202 F.B.S. will now come Home or will move out farther East remains to be seen. The latest idea seems to be that the Avro Anson will take over many of the duties of flying boats in Home waters, and perhaps in the Mediterranean as well. On the other hand, there is at present only one squadron of flying boats in the Iraq Command, at Basra, and one in the Far East Command, at Singapore. They make the very minimum for the work to be done in peace time, and an increase in the number of squadrons East of Suez would be very desirable. There is also the possibility of choosing Cyprus as a station. As for hardship to the personnel that is of less moment in the R.A.F. than in either of the other Services, because the personnel of a squadron is always in a state of being changed, and no one man stays abroad as long as the squadron does.

Presumably a squadron of Ansons will be moved to Malta in due course. It cannot be expected that landplanes will be able to undertake the lengthy flights to the farthest corners of the Mediterranean which have been possible to flying boats. That may not now be thought so important as once it was. Malta is situated near the narrowest part of the Mediterranean, with Africa not so far off to the South, and Sicily quite near on the North. For coastal reconnaissance in these comparatively narrow seas the fast Anson landplanes may be held more useful than flying boats, and they will be able to function there quite as confidently as they will round the coasts of Great Britain.

A New Route

It is also interesting news that Imperial Airways are soon to make Malta a port of call on one of the Empire air routes, and that it will be landplanes (presumably the new Armstrong Whitworth XXVII monoplanes) which will call there. It has never been the intention that the Short flying boats which are supplying the main services should be diverted from their course to call at Malta. This will be a subsidiary service which will cross France, call at Malta, go from there across the sea to Ben Ghazi in Africa, coast along to Mersa Matruh, and thence strike down to Cairo, cutting off the corner in which Alexandria lies. It should be a very useful service, and not only Lord Strickland will feel gratified that it will put Malta on the map of British Empire air routes.

Gadgetitis

IT is not, unfortunately, very often that Mr. Roy Fedden can be persuaded to make a speech. When he does he invariably talks sound sense and says something worth while; so last Friday, at the Martlesham dinner (reported on page 622), his warning about lack of standardisation was a timely one, and the country in general and the Air Ministry in particular cannot afford to disregard it.

Mr. Fedden is not the only one to be alarmed at the number and variety of "gadgets" on modern aircraft and engines, nor is the trouble confined to "gadgets." In *Flight* of October 17, 1935, we published a leading article entitled "Output," in which occurred the following paragraph: "It is impossible to visit one of the aircraft works engaged on the production of service aircraft without becoming impressed by the almost appalling amount of equipment which the modern military aeroplane has to carry. The number of 'gadgets' seems to grow at an alarming rate, with the result that the mounting of military equipment occupies a quite disproportionate percentage of the man-hours spent in getting the machine finished and ready for service." We are naturally glad to have our views backed up by a man like Mr. Fedden, whose personal contact with the problems is an extremely close one.

In the leading article referred to, *Flight* pointed out that the primary structure of an aircraft can now almost be said to have become of secondary importance, certainly as far as rate of production is concerned, and we outlined a possible method of simplification which might reduce the time spent in installing equipment. Mr. Fedden was more concerned with the variety of the equipment and the lack of uniformity and standardisation. He had good cause to be worried. It is not only that accessories of different type and make are being used, apparently indiscriminately, but flanges for attachment have not been standardised; drives in some cases differ considerably, with the result that constructors, in order to save time, sometimes incorporate mountings and drives for alternative types to avoid delay when the particular accessory ultimately turns up.

It was impossible not to be impressed by the seriousness with which Mr. Fedden regarded the situation, and it behoves everyone concerned to heed his suggestion that two experienced production engineers should be appointed, one from a motor firm and one from a precision tool firm, to examine ways and means of simplification and standardisation, and to report upon new designs from a production point of view.

The position at present is that this is nobody's particular business, and the result is, not unnaturally, that confusion and delays occur. We venture to think that, should a real emergency arise, confusion might well turn into chaos unless steps are taken immediately to get some kind of unifying influence to work.

SIDE-BY-SIDE AUTOGIRO SEATING: It is now possible to publish a photograph of the Westland-Lepere Autogiro, which is of the direct-control type and has a very wide wheel track to ensure stability on the ground. The engine is a 90 h.p. Pobjoy Niagara. The large expanse of transparent covering gives an excellent view from the cabin. (*Flight* photograph.)

The Outlook

A Running Commentary on Air Topics

Trans-Atlantic Air Service

THERE is something rather obscure about the news from Washington, where a British delegation has been conferring with American authorities about the institution of an air mail service across the Atlantic, to be worked by Imperial Airways and Pan American Airways in collaboration. The decision reported is that the American company is to receive the mail contract for the flights which start in America, and the British company will have the right to the assistance of its own Government for flights which start from the British Isles.

At first sight it looks as if the American aeroplanes returning homewards will have to fly without any financial help, and that the British machines on their homeward flights will be in the same case. Things are not likely to work out thus in practice. There is no precedent for the United States Government giving official help to a foreign company for the carriage of American mails, and so it is natural that that Government should confine its activities to a mail contract with Pan American Airways. Doubtless the two companies will make a private arrangement which will be satisfactory to both.

The Aerodromes Question

OF the setting up of Boards there is no end, and the plain man is apt to be confused between them all. It is really a relief to hear that one Board has ceased to exist.

The Aerodromes Advisory Board, which was formed in 1933, had excellent intentions. The paucity of aerodromes in the country was a serious handicap to private flying, and it might become a handicap to commercial flying. Local authorities were much bewildered as to what they ought to do, and how they ought to do it. They knew not where to turn for unbiased advice. The Aerodromes Advisory Board was a voluntary body which tried to help them, and voluntary efforts of that sort deserve praise.

Of late, however, internal commercial air transport has developed and has begun to take form and shape. That takes the matter somewhat beyond the sphere of voluntary assistance. The State has stepped in, and has itself set up two committees, that of Sir Henry Maybury and that of Sir Warren Fisher, to deal with air transport in general. The process of Board-making goes on, and for one old Board we get two new ones. It is certainly right that we should not have to deal with all three.

Our Own Book

FLIGHT is very grateful to the Secretary of State for Air (whom, incidentally, it would like respectfully to congratulate on his elevation to the peerage) for having written a Foreword to the book, "Squadrons of the Royal Air Force," which is being published in a few days' time. The book is a good example of co-operation in useful publicity between a Government Department and an organ of the Press. Permission was given by the Air Ministry for representatives of *Flight* to visit a number of stations of the R.A.F., and we should like to add our gratitude to Marshal of the Royal Air Force Sir John Salmond for having first given permission for those visits when he was Chief of the Air Staff. Gratitude is also due to the Lords of the Admiralty for leave to visit ships of the Royal Navy and to describe their air activities. The result is this book, which, we are gratified to believe, is the first of its kind to be published—the first book to take the public behind the scenes of the R.A.F. and to present a picture of the different squadrons, training establishments, etc., and of the work which they do.

The R.A.F. is not only the youngest fighting Service; it is also the one which is least understood by the people of the United Kingdom. The varying functions of fighters, bombers, and other classes of squadron are but vaguely comprehended by the man in the street. Yet the Service stands high in popular favour, and every Briton is proud of the standard which it has attained. A more intimate acquaintance with the inner workings of that Service, and what may be described as a personal introduction to many of the squadrons and other units, will be, we believe, to the benefit of the public and also of the Royal Air Force, especially at this time, when the strength of the Force is being largely increased. That introduction is provided by our own book.

Motor Cyclists and the Air

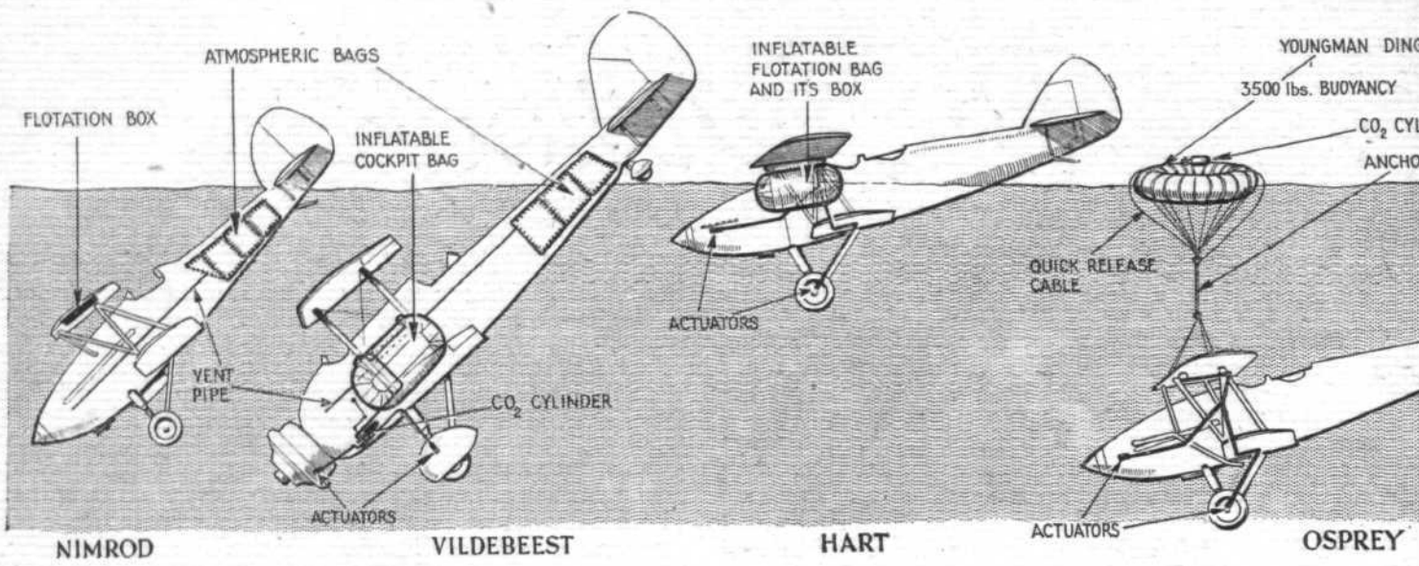
IN the recent debate in the House of Lords on the Address in reply to the King's Speech, Lord Sandhurst made the statement that "the cyclists, and particularly the motor cyclists, provided in the last war practically the whole of our Flying Corps." Though this may have been a slight exaggeration, many racing and competition-riding motor cyclists did distinguish themselves as R.F.C. pilots. But the main point that Lord Sandhurst wished to drive home was that the motor cyclist usually makes a good air pilot. He certainly needs to be a good judge of speed, to have good "hands," and to have very quick reactions, and all of these qualities are useful in a pilot. It is also said that a good horseman makes a good pilot, because of his good hands, even though he may think an internal-combustion engine a distasteful substitute for a gallant charger of flesh and blood.

Time to Get Going

THREE weeks have now lapsed since the Royal Aero Club announced in *Flight* that for the 1936 Coupe Deutsch contest the French Air Ministry was offering to buy the winning machine for 900,000 francs, and that this offer was open to foreign as well as to French competitors. It was pointed out in *Flight* of November 21 that the opportunity thus offered should appeal to British aircraft constructors, as the prizes were substantial enough to warrant participation, not to mention the prestige.

So far, we have heard of no entries for the Deutsch Cup, and, although there is no immediate hurry for a few days (the entries list closes on December 20, but late entries at a fee of 6,000 francs are received up till June 15 next year), it is certainly time to begin thinking about the matter.

It will be recollected that the only restriction is that engines must not exceed eight litres in capacity. If we are not mistaken, the Napier-Halford Rapier engines have a capacity of 8,800 c.c. That would seem to indicate that a shortening of the stroke by introducing a new crankshaft with shorter crank throw would do the trick and reduce the capacity to the eight litres stipulated. It is not, perhaps, too much to expect that the supercharged Rapier, with its capacity reduced to eight litres, might, for racing purposes, be counted on to develop something like 450 h.p. Mounted in a really clean racing aeroplane, this power should give enough speed to make it worth while competing with the French *bolides*.



This series of sketches, specially prepared by *Flight*, shows the various types of gear and the flotation angles of certain R.A.F. machines. Those fitted with Youngman dinghies, of course, do not sink immediately.

WHEELS ov

Part II : *More Flotation Gear Instal the You*

B

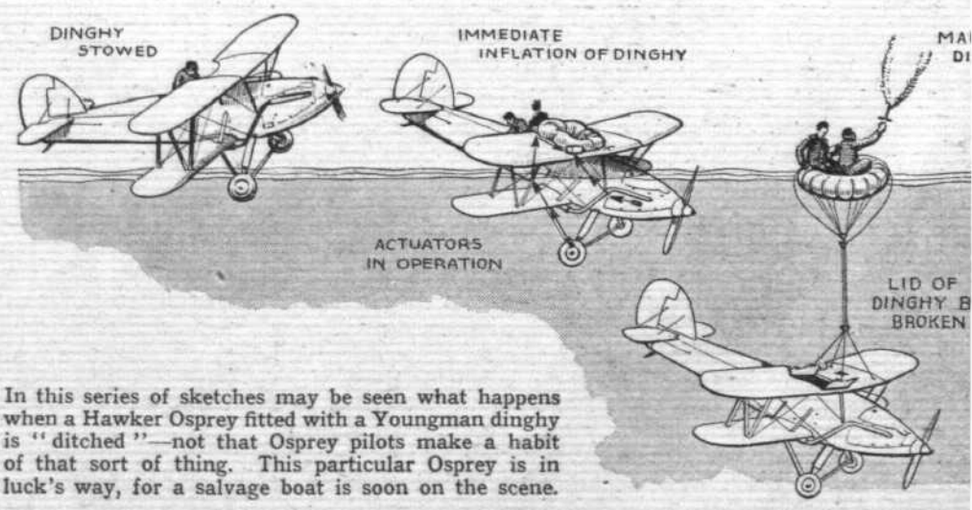
IN last week's article several references were made to the Youngman dinghy, and it may, perhaps, be wondered how a dinghy can act as flotation gear for an aeroplane. The Youngman acts not only in this capacity, but when detached from the aircraft as a normal dinghy. It was designed by Mr. R. T. Youngman, now of the Fairey Company, and is being installed in the Hawker Osprey III and IV and the Fairey Swordfish, among other types.

Three standard sizes of Youngman dinghy (made by the R.F.D. Company, of Guildford) are being used, these being of 1,900 lb., 3,000 lb., and 4,500 lb. buoyancy. The latter two sizes, respectively, are used by the Osprey and Swordfish.

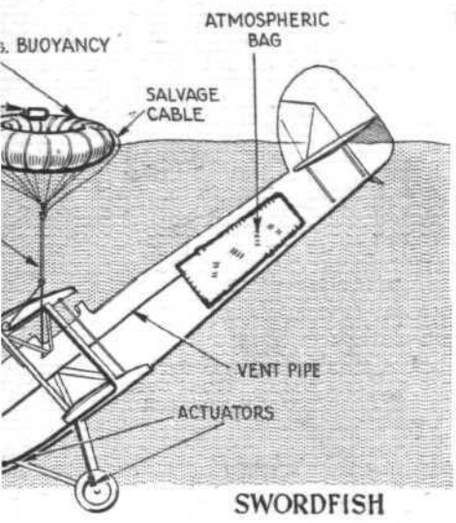
The Youngman dinghy itself is a large circular affair and might be regarded, in fact, as a circular tube of large diameter with a "floor" in the centre. It is made of rubberised fabric and has a partition running round the centre of the tubular portion, dividing it into two halves. The Swordfish dinghy is 8ft. 6in. in diameter, with a 4ft. "floor." Dinghy stowage is usually provided in a top main plane, the dinghy being carried, not folded, but tucked away to ensure easy inflation, in a wooden box between the spars. To it is attached a carbon-dioxide cylinder which is provided with the same automatic operating gear as described in connection with the inflatable bag on the Vildebeest. A series of cables runs from the tubular portion of the dinghy, converging at a point some feet below. Thence another cable travels to the ring of the slinging gear, which is carried in all Fleet Air Arm machines larger than single-seaters, and which is normally used to hoist the machine, when in floatplane form, on board a warship. The ring, when not in use, lies flush with the top of the centre section.

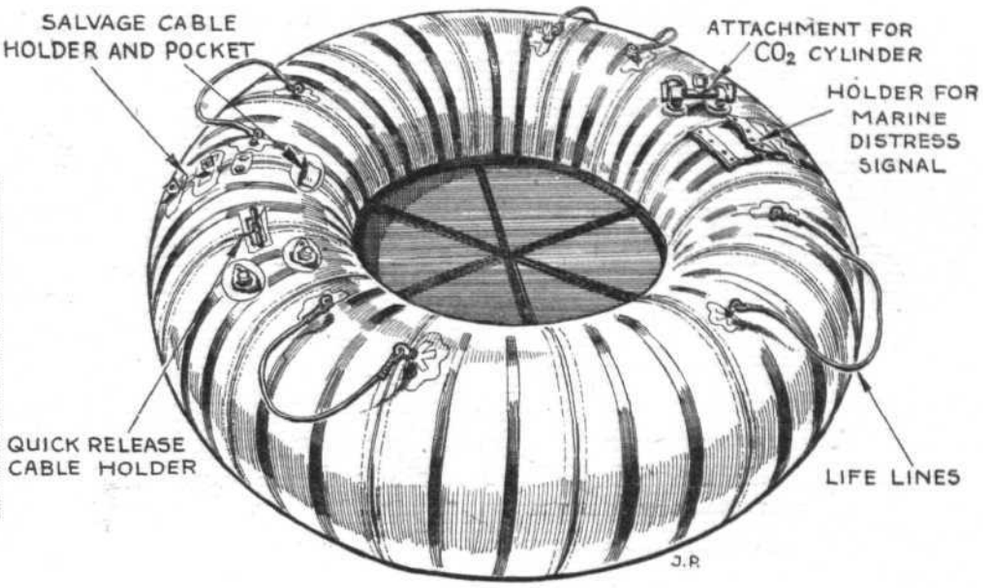
When the dinghy is inflated, either manually or automatically, it bursts off the plywood lid of its box and bobs up to the surface of the water taking the weight of the machine, which gradually sinks. Then the crew clambers from the cockpits into the dinghy. Should a ship be near it will, of course, if possible, come alongside and hook the salvage cable, carried on the dinghy and attached to the slinging gear, to its derrick, and the occupants of the dinghy will operate the quick release, which is also carried on board, and drift away, allowing their machine to be salvaged in the normal fashion. Should no help be forthcoming, of course, they are at liberty to detach the dinghy from their machine whenever they wish.

Lashed to the dinghy is a marine distress signal in a waterproof case, a hand pump (or topping pump as it is known) to make up for any leakage of gas and, if desired, rations, although these are not normally carried. The hand pump is connected to a manifold containing two balance valves which keep an equal amount of gas on each side of the partition which



In this series of sketches may be seen what happens when a Hawker Osprey fitted with a Youngman dinghy is "ditched"—not that Osprey pilots make a habit of that sort of thing. This particular Osprey is in luck's way, for a salvage boat is soon on the scene.





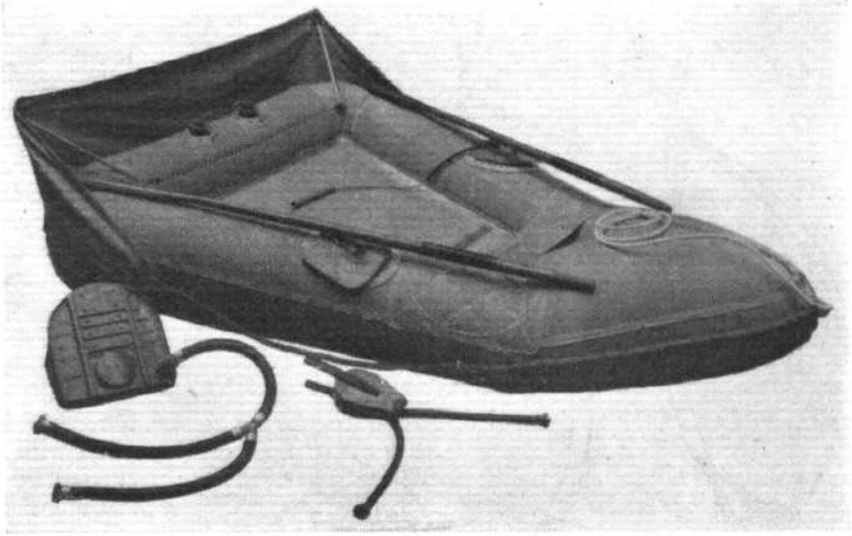
This is the Youngman dinghy as fitted to the Fairey Swordfish torpedo spotter reconnaissance machine, now in production for the Fleet Air Arm.

WATER

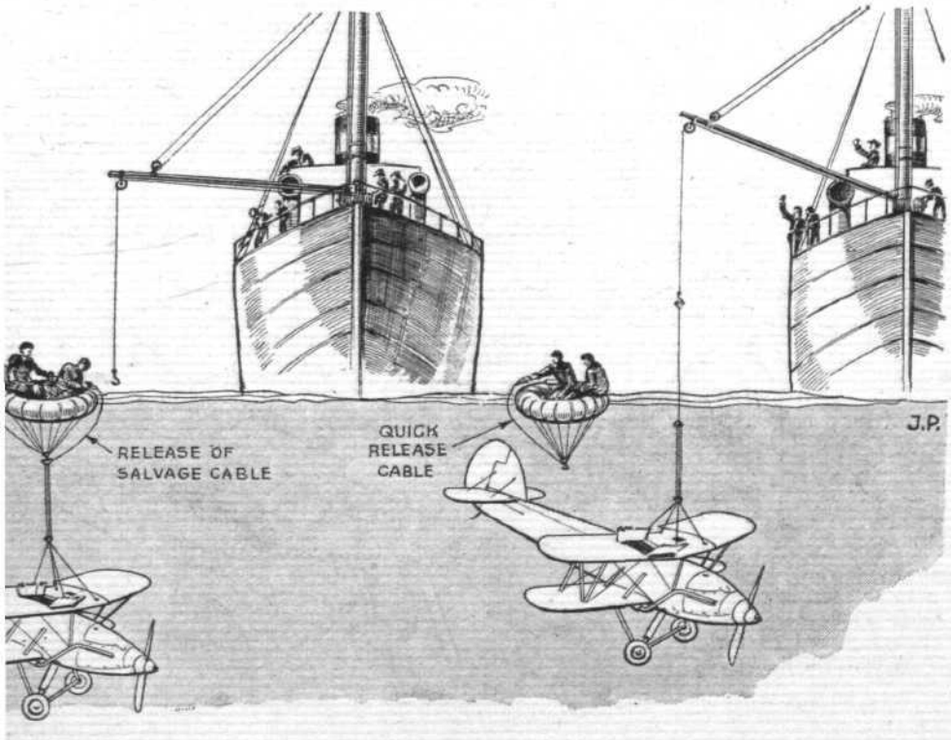
wed and Explained : How hy Operates

runs circumferentially round the dinghy.

A method of automatic operation, rather different from the Walter Kidde gear already described, is being experimented with, and is giving satisfaction. It is a product of the R.F.D. Company, and depends for its action on the completion of an electric circuit when an aircraft descends into the water. When the circuit is completed a small cartridge is fired moving a plunger forward and causing a cutter to pierce the closure of the carbon dioxide bottle. A special arrangement is

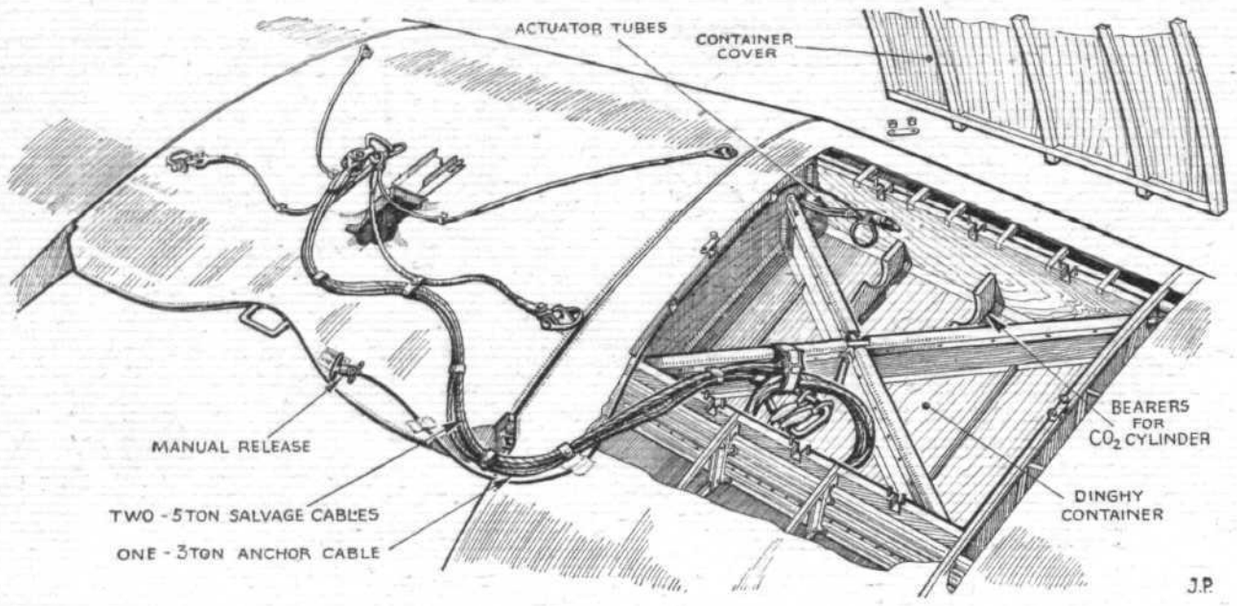


An R.F.D. dinghy suitable for use from large flying boats. Carbon dioxide inflation may be provided, and there are hand and foot bellows.

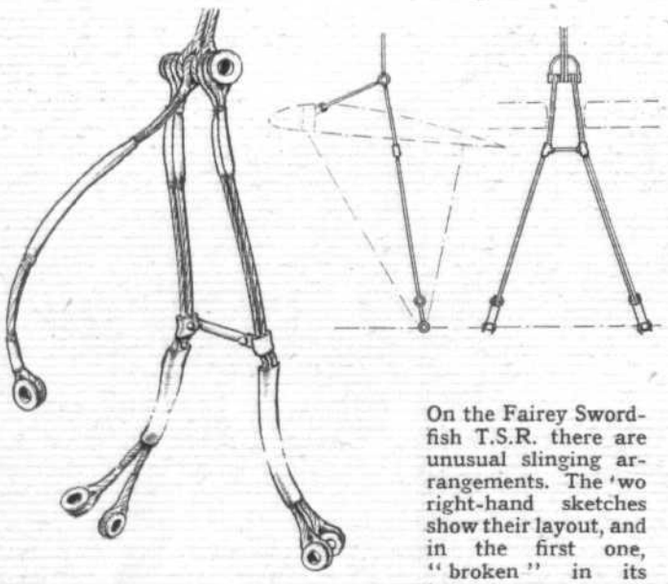


provided for locking the cutter against return movement under pressure of the escaping gas.

It sometimes becomes necessary to provide standard types of landplane with flotation gear when they have to operate over the sea. A case in point is the Hawker Hart light bomber, which is sometimes called upon to carry out bombing practice some distance away from land. The Hart, under such circumstances, is equipped with two large flotation bags which, when deflated, are carried in containers just outboard of the top-centre section. They are operated by a normal type of Kidde gear with two actuators and provision for manual operation, the carbon-dioxide cylinder being carried within the wing. The gas, on being discharged through the head of the cylinder, is carried *via* copper piping to



On the Hawker Osprey the Youngman dinghy is carried in a box between the spars of the top starboard main plane. This view shows the complete installation of the box and the slinging gear in the centre section.



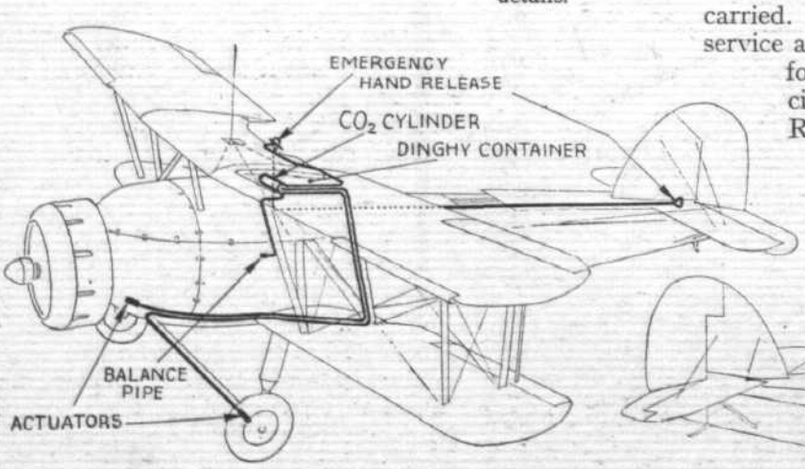
On the Fairey Swordfish T.S.R. there are unusual slinging arrangements. The two right-hand sketches show their layout, and in the first one, "broken" in its lower part, may be seen some of the details.

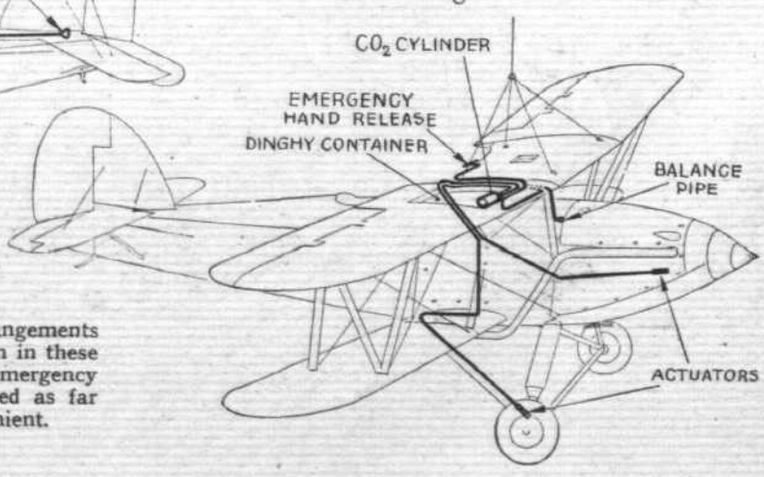
piston bag releases which act in two ways. First, they withdraw the pins of the bag containers allowing the lids to fall clear, and, secondly, prevent the gas from entering the bags if, for any reason, the lids of the containers become fouled. One bag alone is sufficient to float the Hart. Gear generally similar to this type, incidentally, is employed on a large number of machines operating with the U.S. Navy.

Dinghies, not of the Youngman type, but of normal design, and also manufactured by the R.F.D. Co., Ltd., form part of the equipment of flying boats, seaplanes, and certain types of ship planes. In the main they are manually operated, but that, for instance, employed on the Avro Anson coastal reconnaissance machine is supplied with Walter Kidde automatic gear. The dinghies carried by large flying boats seat four or five men, and are inflated either from a carbon-dioxide cylinder or by a hand or foot pump. There is also a smaller three-seater dinghy issued for aircraft with crews of up to three; it is a three-cornered model with a manually operated carbon-dioxide cylinder for inflation.

It is not only on Service machines that dinghies are carried. The D.H. 86's operating on the trans-Tasman service are provided with them, and in the U.S.A. they form part of the equipment of certain commercial machines. All floatplanes used by the R.A.F., incidentally, carry emergency dinghies.

The actual flotation gear fitted to a machine



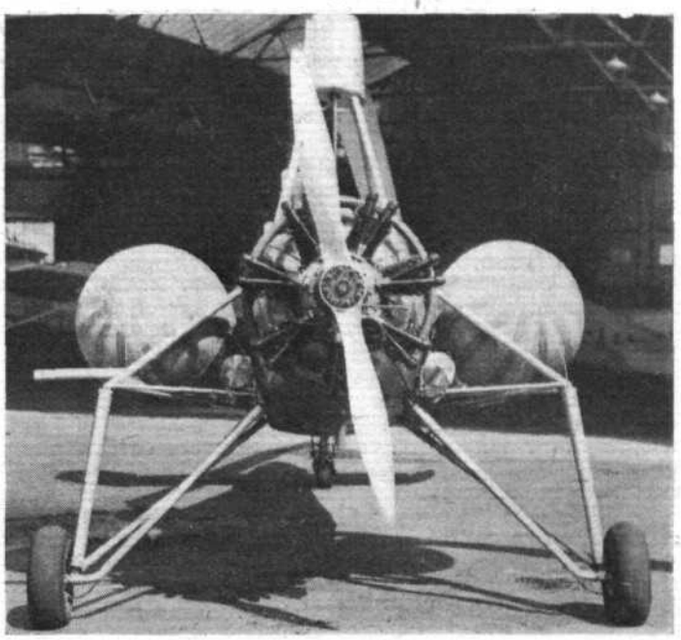


The layout of the automatic and manual operation arrangements on the Fairey Swordfish and Hawker Osprey may be seen in these *Flight* diagrams. Note that in the Swordfish there is an emergency hand release in the tail. One actuator is always placed as far forward as possible, and its twin as low as convenient.

does not total in buoyancy the all-up weight of the aircraft concerned. Allowance is made, of course, for the buoyancy of the machine itself. Before a new type of aeroplane is fitted with flotation gear a table is drawn up by the manufacturers giving the buoyancy of every item of equipment which is normally carried. A metal machine, particularly if sealed welded steel tubular construction is employed, can prove remarkably buoyant. No allowance is made for the air trapped in the cylinders of the engine.

When all necessary buoyancy calculations have been made a reserve of 1.3 times the fully loaded weight of the machine is left to allow for a good flotation line for the Youngman dinghy, should one be carried, and for leakage.

Remarkably few Fleet Air Arm machines have had occasion to try out their gear, although it has saved more than one life since becoming standard equipment. One can do no better, finally, than to recall the experience of a U.S. Navy pilot attached to the U.S.S. *Lexington* who made a forced descent into the sea. For twenty-two hours he remained on his machine until the sea became rougher, when he abandoned it for his dinghy, in which he drifted for five days before being picked up. It would be interesting to hear that pilot's views on flotation gear.



When this autogiro was delivered to the Fleet Air Arm for experimental carrier operation, an unusual type of flotation gear was fitted. Normally the spherical air bags are stowed in containers on the sides of the fuselage. (*Flight* photograph.)

CO-EFFICIENCY of EXPANSION

Steel and the Aircraft Industry : Sheffield's Approved Inspectors Forgather

THE average person outside the aircraft industry seems to regard an A.I.D. inspector as a sort of back-stair detective, who, disguised in a bowler hat and a false beard and armed with a micrometer, lurks behind machinery in aeroplane factories—which is just as inaccurate as thinking that A.I.D. stands for "Aeronautical Inspection Department."

In actual fact, an Aeronautical Inspection Directorate inspector, or examiner, or whatever he happens to be, is an extremely human and hard-working civil servant. Equally human and hard working, though not a civil servant, is the Approved Inspector, who is responsible to him. An Approved Inspector for the benefit of the uninitiated, is a member of a works staff appointed to act as resident inspector of the aeroplanes, components, materials or what-not produced by his factory. Approved by the A.I.D., he is implicitly trusted to do his job conscientiously and to work hand-in-hand with the inspector or examiner, who pays him periodical visits and acts as liaison officer between the factories and the local A.I.D. headquarters in the matter of test results, release notes and the rest of the enormous amount of paper work which this highly efficient tooth-comb system involves.

Nowhere does this organisation reach greater proportions than in grim but warm-hearted Sheffield, where the aircraft steels industry has its roots, and in that city, on Wednesday of last week, over 200 A.I.s, members of the local A.I.D. staff, and representatives of works staffs, gathered for their annual dinner—which the menu described, a little singularly, as the 'Approved Inspector's Dinner."

Like the local products, the brief speeches were bright and incisive. In the Chair was Mr. C. Wilkinson, A.I.D. Inspector-in-Charge at Sheffield. Lt. Col. H. W. S. Outram, C.B.E., Director of Aeronautical Inspection, in proposing the toast of "The Approved Inspectors,' said that one point borne in mind when the Approved Inspector system was inaugurated was its great adaptability in the event of sudden expansion being necessary. That hope had now been realised. They had dealt successfully with the enormous increase in aircraft steel orders only by virtue of the Approved Inspector system. He wondered what would have happened under the old method, and would have expected repetitions of an incident which once actually occurred—a man who had been dismissed from a factory returned to it a few days later as an A.I.D. inspector (laughter).

It was greatly to the credit of Sheffield's steelmakers, he said, that since the expansion no corresponding increase had taken place in the number of faults reported. He concluded by paying a tribute to Mr. Wilkinson, who had arrived to take up the post of Chief Inspector in Sheffield less than two months ago, just at that moment of stress.

Lord Riverdale of Sheffield, the well-known steelmaker, replied in a very entertaining speech, in which he recalled the early steel furnaces, into which all sorts of things went, including old teapots and mangles. Yet every new process, he said, had left things that were done better in the old way; for some purposes the old crucible steel was still unsurpassed.

Mr. Alexander Williamson, late Master Cutler of Sheffield, proposing "The Future Success of the A.I.D.," said that the new demands of the aircraft manufacturers had been a great stimulus to the steel industry, though he did hope to see a reduction in the number of D.T.D. specifications going hand-in-hand with the steady improvement in quality.

Mr. Wilkinson spoke appreciatively of the work of the local factories; before coming up he had visited most of the country's aircraft works, and knew how well Sheffield products were liked. He went on to say that he was sorry to see the almost total absence of aeroplanes from the Sheffield air. They appeared to be behind the times. Perhaps an "Emancipation Flight" from London to Sheffield, on the lines of the London-Brighton run in motor car history, might be considered [It appears that pleas for the establishment of a local aerodrome have been turned down again and again. Apparently certain of the City Elders hold the view that "If God had intended man to fly He would have given him wing." Which, for a city of which the aircraft industry is such a good customer, seems a little inconsistent, to say the least of it. Again, apparently it is argued that an aerodrome would be a target for bombs. One can imagine an enemy pilot forsaking Vickers' three huge steelworks in favour of a grass field and a couple of Club Moths in cold storage.—Ed.]

A Royal Warrant

THE De Havilland Aircraft Co., Ltd., have just been honoured by being appointed aircraft manufacturers to H.R.H. the Prince of Wales.

It will be remembered that they have supplied His Royal Highness with a number of machines, including the D.H.89 described in *Flight* of May 2, 1935.

MARTLESHAM ENTERTAINS

Some Sound Sense Talked at the Annual Dinner to the Industry

THAT the manufacture of kites by the British aircraft industry has now definitely ceased was announced officially by Group Capt. A. C. Maund, C.B.E., D.S.O., at the Aeroplane and Armament Experimental Establishment, Martlesham Heath, last Friday. The occasion was the dinner which the Commanding Officer and Officers, R.A.F., of the Establishment give annually to representatives of the aircraft industry, and which is usually referred to as the Contractors' Dinner. Group Capt. Maund was welcoming his guests and chose to make that announcement as an opening sentence, semi-humorously, of course. He added that the British aircraft industry was now making aeroplanes instead of kites, referring to the new military types that are coming along from a number of firms, and which are nearly all very clean cantilever monoplanes.

Recalling that the aircraft firms were now busy on the first real production orders since the war, Group Capt. Maund said that Martlesham was trying to keep abreast of the new requirements and had already extended the area of the aerodrome, had new smooth runways prepared, and had obstructions removed. This statement was greeted with mock derision by the designers present, whose new products were thus jestingly criticised. He also mentioned that Martlesham had had new speed course equipment installed.

Fallible Experts

In more serious vein, Group Capt. Maund pointed out that although he was doing his best to reduce the time taken for tests of new aircraft types, an examination showed that the average time which a machine spent at Martlesham was only one-twentieth of its total development time, so that the industry itself must help in the speeding-up process. Referring to the fallibility of experts, Group Capt. Maund recalled that experts had told them that the monoplane might be faster than the biplane, but would not have as good controllability. That had not been found to be true. Experts had said that the structure weight of the monoplane must necessarily be greater than that of the biplane. Again, that had not been found to be correct. By going to fairly high wing loadings, the structure weight could even be made smaller than that of the biplane. It had been said that the three-bladed airscrew was inefficient, but there had been no loss in performance when they were fitted. Best of all, the new machines had been found very nice to fly.

With reference to future trend of design, Group Capt. Maund said it seemed to him that nearly all the new British designs were, on the whole, larger than comparable foreign types. He suggested that as size had a lot to do with performance, a study should be made of the minimum size of aircraft necessary for doing a certain job of work.

Flt.-Lt. P. W. S. Bulman, Hawkers' chief test pilot, made a very humorous speech, during which he made amusing references to the drawings on the menu. He finished up by offering the very excellent suggestion that it was high time the aircraft industry entertained the Martlesham officers. It is to be hoped that this suggestion will be acted upon by those concerned.

Mr. R. Fedden, designer of the famous Bristol aero engines, expressed regret that he was not blessed with the ability to make a humorous speech, but more than made up for that by certain technical comments and suggestions which, one hopes, will be given due consideration by the powers that be. He recalled that in 1932 he pleaded for fuels of a higher octane number, and that they had now got 87 octane fuels. He gave it as his considered opinion that but for this fuel the new high-performance aircraft would not have existed and asked for the introduction of 100 octane fuels. When that came into use it would mean a revolutionary improvement in aircraft performance.

Some eight years ago the late Sir Sefton Brancker had said in a discussion of the Diesel engine, that the only way to find out if it was worth while was to build a number and try them out thoroughly. The position was the same to-day. He personally did not think the Diesel could compete with the modern petrol engine, but the only way to find out was by building and trying. He thought there was no reason why a 1,000 h.p. Diesel should not be built for a weight of 1¾lb. per h.p. and it should have a remarkably consistent fuel consumption.

In view of the need to produce a large number of machines in a very short time, Mr. Fedden said the time had come to introduce a certain amount of standardisation. He was, he said, terribly alarmed at the number of gadgets on machines and engines and asked for standardisation of a reasonable number. On a recent visit to Sheffield he had been impressed by the very satisfactory position in connection with the great strides that had been made in alloy steels. He thought the time had come when they should review steel specifications, of which there were too many. [A speaker at the Sheffield A.I.D. dinner, reported elsewhere, made the same point.—Ed.] If real mass production became necessary, alloy steels would hold up production by forming a bottleneck.

Simplification

In conclusion, Mr. Fedden pleaded for the establishment of two new posts to help in speeding-up production. One of these, he suggested, should be drawn from a motor car firm, and the other from the planning department of a precision tool company The duty of these two new officials should be to examine all drawings and to report on new designs, solely from a production point of view.

Lt. Col. Lockwood Marsh complained jokingly of the fact that, as a representative of the Press, he was not allowed to see much of what went on at Martlesham. He even thought that this secrecy was carried to the extent of always holding these dinners after dark, and, in addition, on a foggy night. He envied Martlesham two things: they were the first to see all the new aircraft types, and afterwards they reported on them and said exactly what they thought of them, whereas he, as a Pressman, was never permitted to say what he really thought of a new aircraft type.

More "Air-mindedness" Advocated

THAT the schools should be encouraged to teach children more about aviation—as much as about the Army and Navy—was a point made by Rear-Admiral Sir Murray Sueter, M.P., in proposing the toast of "British Aviation" at a luncheon which followed the first annual conference of the National League of Airmen in London last Friday. He was stressing the need for a big reserve of young pilots.

Mr. O. E. Simmonds, M.P., seconding the toast, referred to the League's scheme of low-cost flying training.

Capt. Norman Macmillan, M.C., A.F.C., responding, deplored the apathy of the public with regard to aviation, and said that the time was not far distant when the aircraft of a few big powers would span the world commercially, and machines could be held in reserve for military purposes. If this country was not ready it would cost millions of pounds to build up the commercial side and millions of lives on the military side.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

Thank You !

Flight expresses its appreciation of the complimentary remarks which numerous readers have made, verbally and in writing, on last week's British Aircraft Industry Number.

Friday the Thirteenth ?

Owing to unforeseen circumstances the R.Ae.S. Students' Section supper in London, fixed for to-morrow night, has been cancelled.

After Eight Years

Mr. Edward Sill, an Englishman, and two Americans have set out to search for Mr. Paul Redfern, the American airman, who has been missing in British Guiana for eight years. It has been suggested that Redfern, crippled by a crash, has been living with the natives as their "white god."

Eight Hundred a Year

In his annual report to the President, Mr. George Dern, the U.S. Secretary for War, advocated the inauguration of a five-year plan for the Air Corps, under which about eight hundred machines—half for replacement purposes and the remainder to augment present strength—should be provided annually.

In Search of Ellsworth

At the request of the Australian Government the research vessel *Discovery II* is to proceed to the Bay of Whales to search for Mr. Lincoln Ellsworth and Mr. Hollick Kenyon, who have been missing since November 23. Two aeroplanes will be taken on board at Melbourne. Should the search prove unsuccessful an aerial search will be conducted from Admiral Byrd's base at Little America.

TRAINING SHIP : A recent arrival at Air Service Training, Hamble, is a Short Calcutta flying boat on which Imperial Airways pilots will be instructed in readiness for duty on the Empire routes. Siddeley Tiger engines will eventually be installed. Major Brackley (superintendent of flying, Imperial Airways), who flew the machine from Rochester, is seen in this photograph with Flt. Lt. G. D. Middleton (left), one of the instructors.

Aerial Lullaby

Mr. H. C. Brown, of Gravesend Airport, recently took his day-old son for a flight, during which he performed, according to one report, a loop, a spin and a half roll. The small passenger, it seems, was not impressed.

Boeing Production

In nineteen years the Boeing Aircraft Company has produced nineteen hundred aeroplanes of about sixty different types.

South African Envoys—

Early next year seven Airspeed Envoys of an improved type will be delivered to the South African Government. Four will be civil machines (two for six passengers and the others for five) and the remaining three will carry military equipment in the shape of a Vickers gun for the pilot, a Lewis in a sheltered position on the roof of the fuselage and sixteen 20lb. or three 100lb. bombs

—with Cheetahs and Flaps

The engines for both versions will be Cheetah IXs, using 87 octane fuel and giving a normal output of 310 h.p. Split trailing-edge flaps are also specified. The maximum speed will be 211 m.p.h., the cruising speed at 7,300ft., 189 m.p.h. and the service ceiling 24,000ft. Included in the comprehensive equipment will be Sperry blind-flying instruments.

INAUGURATION : To-morrow (Friday) Viscount Swinton, Secretary of State for Air, is to open the new R.A.F. Reserve School established at Desford, Leicester, by Reid and Sigrist Ltd. The equipment consists of seventeen Tiger Moths, and all are fitted for blind flying in both cockpits, while the indoor instructional devices include the Reid reaction apparatus for testing the aptitude of pilots. The finely equipped buildings are the work of the Fairby Construction Co., Ltd. Weather permitting, visitors to to-morrow's opening ceremony are likely to enjoy a surprise spectacle.

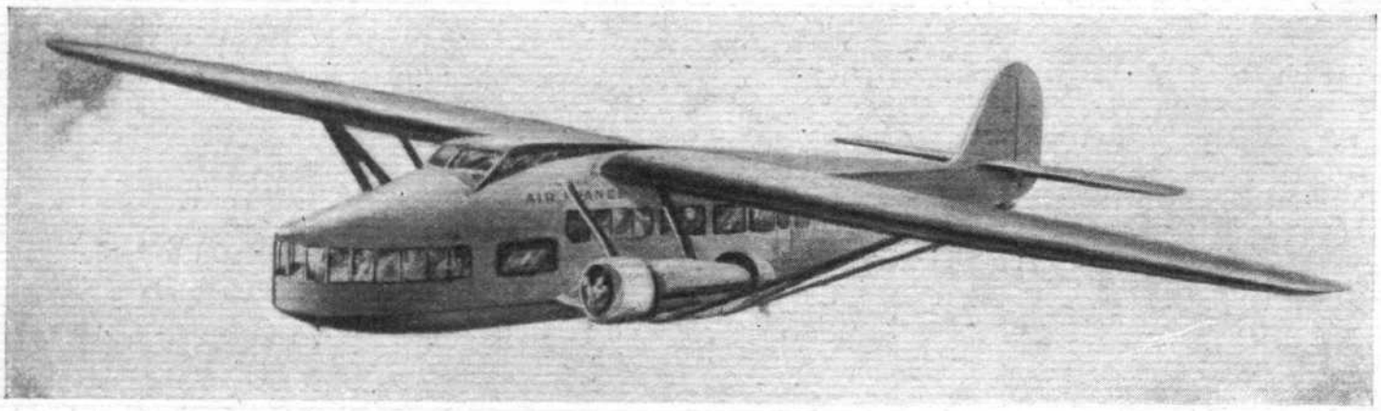
Twenty-five Years Ago

(*From "Flight" of Dec. 10, 1910*)

"Two new weapons for offensive use against airships and aeroplanes have just been completed at the Krupp Works, Essen. One of the guns is mounted on a completely armoured motor car."

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



CROSS-CHANNEL : This is how the new Farman F.224 monoplanes now being built for Air France's London-Paris service will look when completed. One feature of outstanding interest is the forward cabin, which gives an unequalled view for a few lucky passengers. The undercarriages retract into the engine nacelles, which house four Gnome-Rhone Mistral Majors. The maximum speed is expected to be about 190 m.p.h.

THE WEEK AT CROYDON

The German Invasion : No Way In : Practical Meteorology : The Tilbury Volcano : Legendary

AT the beginning of last week considerable excitement was caused by the arrival of the German football team in a D.L.H. Junkers JU.52 from Berlin, whilst at the same time another identical machine arrived from Paris with the German Olympic Games Committee.

The Olympic Games "special" taxied to the tarmac gay with bunting, for, as well as the D.L.H. house flag displayed as usual, a national flag was waved from the window on one side of the fuselage and the Olympic Games banner from the other side. Large crowds met the footballers, and difficulties caused by idle airport staff were blamed on reporters and cameramen, though, for once, the Press was innocent.

A quaint incident occurred when the representative of a newspaper none too popular in Germany asked one of the leaders of the sports battalion for an interview. The leader sought counsel from one of the German Embassy people who were there to meet the footballers, and was given a graphic account of the newspaper's unfriendly policy in no measured terms—in German. The journalist had with him a colleague who spoke perfect German, and who proceeded to air it—also in no measured terms. However, tit-for-tat is fair play, and all parties may say what they like in this country.

We have been somewhat plagued of late by fog at Croydon, and pilots accustomed to the civilised amenities of a number of Continental airports, where it is possible to come in on the radio beam, have been unable to land at Croydon. This airport is in much the same position as Paddington would be if it and its signalling system for twenty miles out or so were lit with candles in jam jars, and if it was deprived of telegraph and telephone facilities. What is heartening is to know that "the matter is having earnest consideration and that the generation now growing up will probably see a blind approach system at the London Terminal Aerodrome."

I caught sight the other day of our old friend Robert Kronfeld proceeding slowly past my window in a super Drone. Then, too, there was the "Flying Flea" which flew the Channel, and the official warning to pilots to hurry away if they encountered a Queen Bee. In foggy weather air-line pilots pray as follows, I am told. . . . "From Drones and Queen Bees or invisible Fleas and such things as gang phut-phut in the fog—Good Lord deliver us."

On December 6, I am informed, Swissair will commence the London-Basle-Zurich service once more, but instead of a "turn-around" service with one Douglas, two will be employed, passing each other *en route*. This will give the Swiss pilots and crew, not forgetting the cheery stewardesses, a chance to see something of London which last summer's three-quarters of an hour on the ground never gave them a chance to do.

Not Quite Fair

Last Saturday was a day of fog which, according to the B.B.C., was blackest at Croydon. Not for the first time on such occasions the B.B.C. did less than justice to commercial air transport, giving an impression to the public that there was practically no flying from Croydon, and unduly stressing, in my opinion, the fact that no machines got in to Croydon. Mention of those companies whose services operated from Croydon in spite of the fog was duly omitted. The ball was opened by Commander Tepas (K.L.M.), who took off with a fully loaded F22 with a big majority of long-distance passengers to whom conveyance by air from Amsterdam to Berlin, Prague, Copenhagen and Malmö were of vital importance. An Air France machine also left for Paris, and Capt. Hattersley, of British Continental Airways, worthily upheld British prestige on the London-Amsterdam route, cutting out Antwerp on account of bad weather, I understand. Then there was the D.L.H. night service, which left as usual at 10 p.m., when the weather at Croydon had completely cleared. The B.B.C. may like to make a note of these matters for the future.

Full marks are due to the Croydon Meteorological Office

for the very valuable assistance given to pilots that day.

For the first time, so far as I know, a big balloon was sent up through the fog with instruments which recorded the exact height of the fog, the temperature and humidity. This was all-important in view of the probability of ice formation, and if these data had not been available it is more than likely that all services would have been cancelled.

Waterspouts, and even the meteors which have been encountered recently, pale to insignificance before a mysterious and alarming explosion in the vicinity of Tilbury, which made a K.L.M. machine, inward bound to Croydon, shudder in the air, and had much the same effect on the passengers, who, incidentally, stated they had seen a flash of fire far below and earth and rocks flying about. It was nowhere near one of those prohibited areas where military and naval experts occasionally blow themselves up in the interests of scientific warfare, and at present the cause of the explosion is unknown. Perhaps it was a volcano, in which case the K.L.M. pilot is one up on the waterspout and meteorite pilots. Anyway, it is to be hoped it will not happen often.

One of the newspapers recently got hold of the fact that Capt Horsey, one of the senior pilots of Imperial Airways, comes of a long line of naval ancestors. Comparatively harmless though this story is, the legend which now surrounds it is that Nelson did not speak at Trafalgar as popularly reported, but remarked, "Kiss me, Horsey, and —er—keep your tail up."

Another famous passenger last week was Fraulein Leni Riefenstaal, the German film star and film director. It was refreshing to see one with a natural complexion. Fraulein Riefenstaal stepped from the D.L.H. machine and went away in an Austin Seven—not in a chromium-plated monster under the bonnet of which three or four Austins could garage in line ahead. On the same machine I thought I saw Herr Steari, the well-known Swiss ski champion.

A. VIATOR.

A Giant in Service

AFTER a long series of tests the *Lieutenant de Vaisseau Paris* left Biscarosse (Marseilles) on Sunday for Dakar, West Africa, on the first stage of a flight to Natal, Brazil, and to Martinique, in the West Indies, with the Christmas mails.

Skye-ward

AS foreshadowed in *Flight* of last week, Northern and Scottish Airways opened a twice-weekly service between Renfrew and the Isle of Skye (Glenbrittle) on December 5. Two D.H. Dragons were used for the inaugural outward trip, on which Lord Inverclyde and Mr. George Nicholson, the managing director of the company, travelled.

Second-class Navigators' Examination Result

THE following candidates were completely successful in the Second-class Air Navigators' examination, held in London during October this pear: V. E. Arnold, R. G. Ballantine, J. L. C. Banks, W. A. Cash, D. H. V. Craig, C. R. Davies, S. M. Ferguson, H. Z. Foreman, Miss P. M. Gower, R. W. H. Hall, E. C. N. Jeffries, C. F. O'Connell, D. J. Peacock, C. M. Sharp, W. J. D'A. Stacey.

The South Atlantic Mail

DURING his visit last month to Buenos Ayres, M. Louis Allegre, director-general of Air France, announced that from January 1 the ocean link on the South American air mail service would be flown every week in both directions. Thus the entire line from London to Santiago in Chili will be a hundred per cent. airborne, bringing to an end the service of fast dispatch boats originally established by Aeropostale, and ensuring a four-day-mail delivery between London and Buenos Ayres.

M. Allegre, incidentally, made the journey between Paris, Rio de Janeiro and Paris in eleven days. His trip might, in fact, be described as the first Transatlantic business flight. The South Atlantic has now been flown fifty-five times by Air France.

British Airways' New Headquarters

ON Monday next British Airways will move into their new London headquarters at Terminal House, Grosvenor Gardens, S.W.1. This move will provide the company with not only more commodious accommodation, but will also be the starting point for all passengers travelling over their routes when they move their flying headquarters to Gatwick. The passengers will be escorted from the new offices to Victoria Station, which is just "across the road," and board the train which will take them to Tinsley Green Station, Gatwick, the journey taking approximately forty minutes.

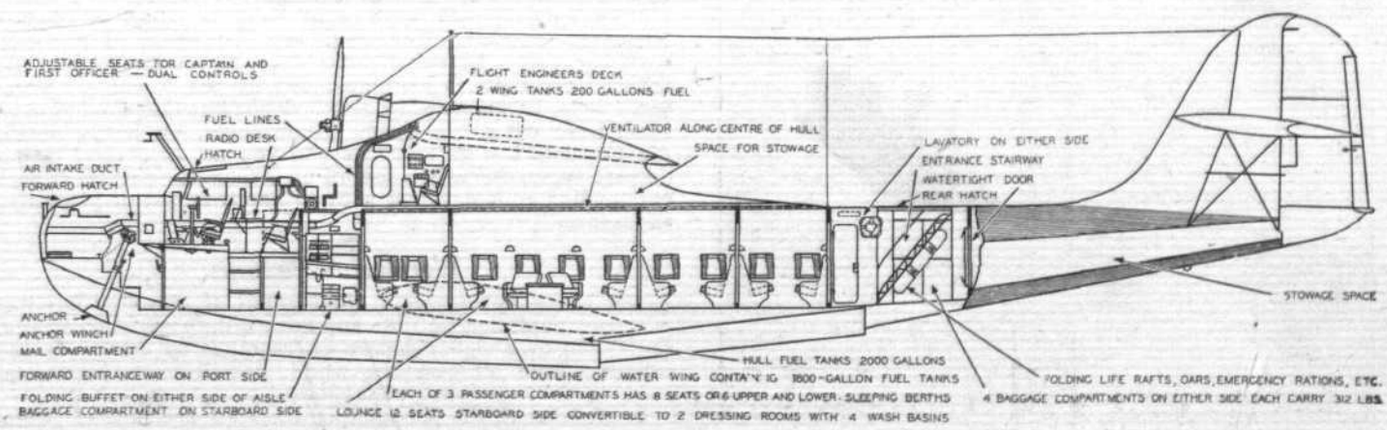
Home from Abyssinia

CAPT. G. BIRKETT and Mr. E. H. Newman, both of Birkett Air Service, have returned from Abyssinia with the Miles Merlin and Leopard Moth which they have been operating out there on Press duty. Capt. Birkett, who stayed with the British Consul at Jibuti, plied back and forth between that town and Cairo (a distance of some 2,000 miles) transporting photographs from Abyssinian railroad to British or Dutch air line.

His longest run, which testifies to the remarkable performance of the Merlin, covered 3,080 miles in 34 hours, including a good night's rest. He flew from Jibuti *via* the compulsory route—Port Sudan, Atbara, Wadi Halfa, to El Sollum, which now replaces Mersa Matruh as a stopping place for the K.L.M. services. K.L.M. had been asked to wait, but left before he arrived, and he flew back to Alexandria, where he handed the package to Imperial Airways.

Mr. Newman was stationed in Addis Ababa, where on one occasion he conversed with the Emperor in French. The next day he was summoned to an audience to report on a flight. Entering the throne-room with the appropriate obeisance, he was ceremonially asked for his identity (which the Emperor knew perfectly well) and for an account of the trip, which was translated by the official interpreter; direct conversation in the French language being considered unsuited to the dignity of the occasion.

The international Press contingents, eating their heads off



TRANS-PACIFIC: This sectioned drawing of the Martin *China Clipper*, which is reproduced by permission of our American contemporary, *Aero Digest*, clearly shows its layout as a passenger carrier. The position of the main fuel tanks is interesting.

at G.H.Q. in the intervals between abortive attempts to reach the fighting, are gradually thinning out as the world loses interest in the eternal cross-currents of contradictory reports.

United Airways made their last journey from Heston on Saturday, November 30. On the following Monday they commenced operation from Abridge as part of the British Airways merger scheme.

On December 1, British-American Air Services carried the Sheffield Wednesday team to Lille in two aeroplanes, a D.H.86 and 89, and brought them back to London (Stapleford) the following day.

In November general traffic increased by 63 per cent. over the same month last year, and Jersey Airways traffic showed a 59 per cent. increase.

Transoceanic

UNANIMOUS agreement at the Transatlantic Air Mail Conference was reported last week from Ottawa where this conference concluded on December 2. So that, for the moment at any rate, the remaining problems are largely of a technical nature and the official announcement suggested that survey flights would be made next year and that a regular mail service should be established during 1937.

The representatives of Canada, Great Britain and the I.F.S. then proceeded to Washington in order to confer with the American authorities. There, the northern route, by way of Harbour Grace, Newfoundland, was agreed upon, though the American spokesman drew attention to the advantages of the Azores-Bermuda route for westbound journeys.

Imperial Airways is to receive the mail contract for the westbound services, while the Pan American Airways will carry the eastbound mail. Two radio beacons will be anchored in the Atlantic next year; the British Government will arrange for one some 600 miles off the Irish coast while the American Government will place one about the same distance from Newfoundland. Since the prevailing winds are from the west, Imperial Airways' portion would appear to be the harder.

Meanwhile, the Martin *China Clipper* has reached Alameda again after a 16,000-mile flight across the Pacific to Manila and back. On the homeward journey only five days were taken and she carried quite a large number of passengers, in addition to freight and mail, over some of the sections. A section through the Martin boat is reproduced on p. 625.

Training Commercial Pilots

BRITISH Airways, Ltd., the new combine formed by Hillman's Airways, United Airways, and Spartan Air Lines, have decided to offer facilities to pilots with sufficient experience to study for their second-class navigators' tickets.

The company has for some time been giving consideration to the problem of the officer who has considerable flying experience in the R.A.F., but who, after leaving, is unable to obtain employment until he has passed this examination. The next examination, for which it is possible to enter now, is not held until March, 1936, and this bears heavily on excellent pilots who might otherwise be unemployed until March and who might even be lost to civil aviation just when the air lines need all the experienced men they can secure.

British Airways are, therefore, taking on pilots who have 1,000 hours or more of flying experience, and these pilots will be trained by an instructor in navigation and will be able to receive salaries during the period of training.

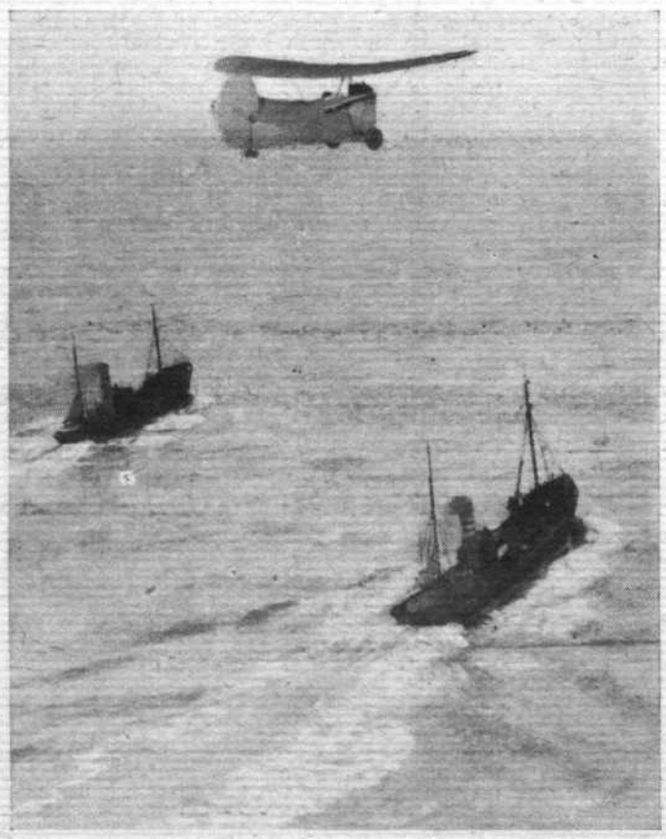
HERE and THERE

By "Pou" to France

MR. STEPHEN APPLEBY flew from Lympne to St. Inglevert last Thursday in a British *Pou du Ciel*, built by Carden-Baynes Aircraft and fitted with one of the new 30 h.p. Carden engines. His time was exactly 35 minutes, cruising at 3,000-3,300 r.p.m. and flying between 1,500 and 2,000 feet for most of the way. He says that he was quite comfortable and warm, although he wore no coat or goggles.

On arrival at St. Inglevert he demonstrated the capabilities of his *Pou*, which is the first seen in France with the new Carden power plant. Considerable interest was displayed in the engine, for a number of French enthusiasts had read about it in *Flight*. They seemed greatly impressed, says Mr. Appleby, by the excellent climbing powers of the British *Pou* and by the top speed of more than 70 m.p.h.

Equipment used on Mr. Appleby's machine included the following: Zenith carburetter, Champion plugs, Wooden Airscrew, Smith's instruments, Short and Mason Sestrel compass, Germ oils, Cellon dope, Shell petrol, Airvelope cushion, Rhodoid windscreen, and a new type of tail wheel by the Hazel Grove Rubber Co. of Stockport.



To say that Mr. S. V. Appleby had an escort on his Channel flight would do an injustice to his 70 m.p.h. *Pou*.

Death of Sir John Carden

IT is with deepest regret that *Flight* learns, at the moment of going to press, of the reported death of Sir John Carden. He was returning from Brussels in the Savoia-Marchetti which crashed at Tatsfield on Tuesday evening.

Sir John was well known as an aeronautical engineer, and for the development of the Carden light aircraft engine.

Kingsford-Smith : Air Minister's Message

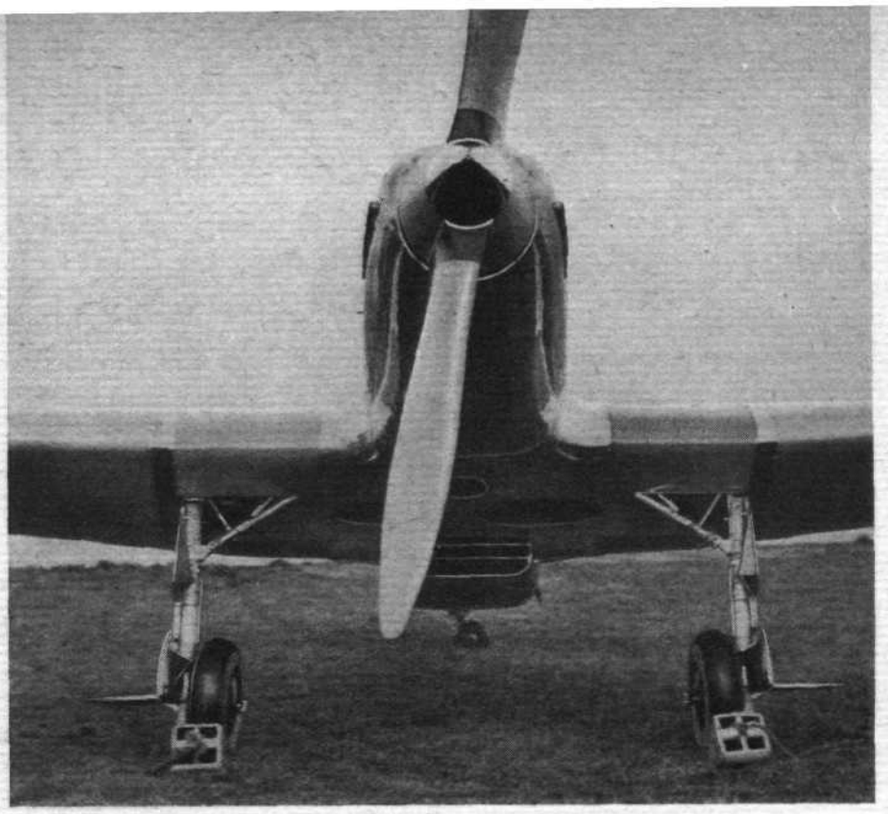
VISCOUNT SWINTON, Secretary of State for Air, has sent the following message of sympathy to the Hon. R. A. Parkhill, the Australian Minister of Defence, following the loss of Air Commodore Sir Charles E. Kingsford-Smith, K.B.E., M.C., A.F.C., and his companion, Mr. J. T. Pethybridge, during their flight from England to Australia:—

"So long as any substantial hope remained of finding Kingsford-Smith and his companion I have refrained from telegraphing you. Lapse of time since his disappearance and failure of exhaustive searches made by the Royal Air Force and others, I fear, now leave little doubt but that fatal disaster must have overtaken them. Accordingly, on behalf of the Air Council, I wish to convey to you an expression of our deepest sympathy in the loss of an Australian airman of such outstanding gallantry and with so fine a record of pioneering endeavour."

Wonderful Pictures

FOR the forty-first year, *Photograms of the Year* has just been published by Iliffe and Sons Ltd., at 5s. This work, containing over eighty superb photographs on art paper and collected from all over the world, constitutes a high-water mark in photographic publications.

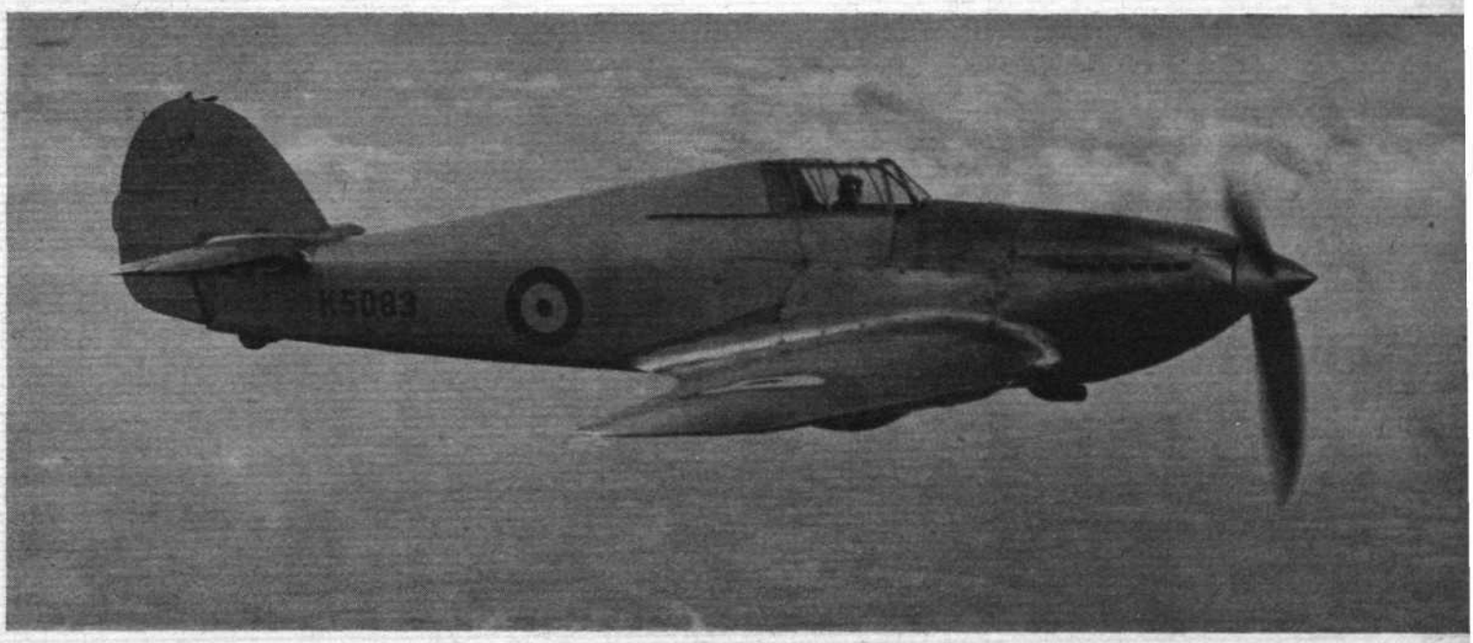
In addition to the photographs there are accounts of photographic progress throughout the world, a critique of the year's work by the Editor, Mr. F. J. Mortimer, and a complete list of particulars of British photographic societies.

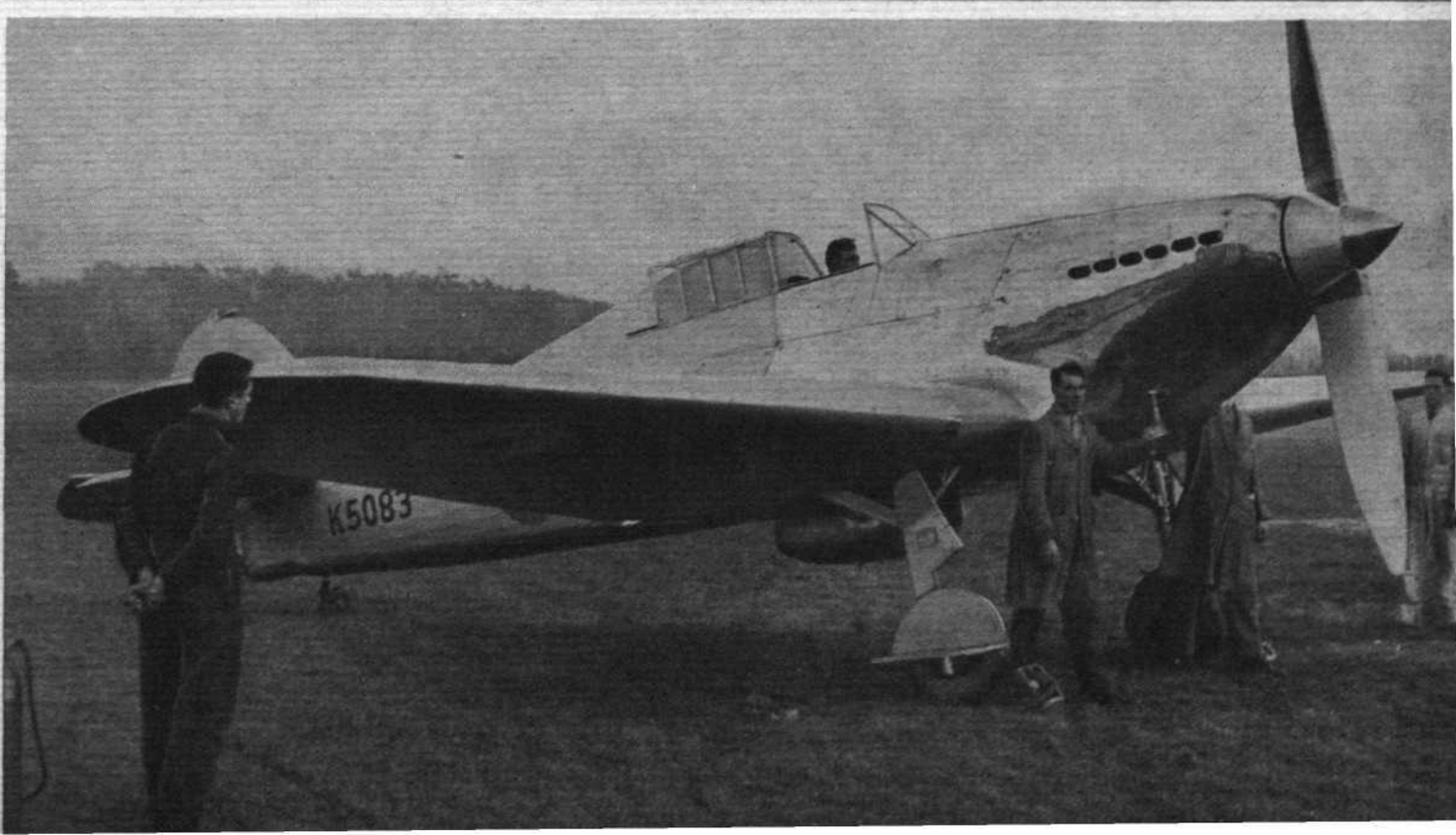


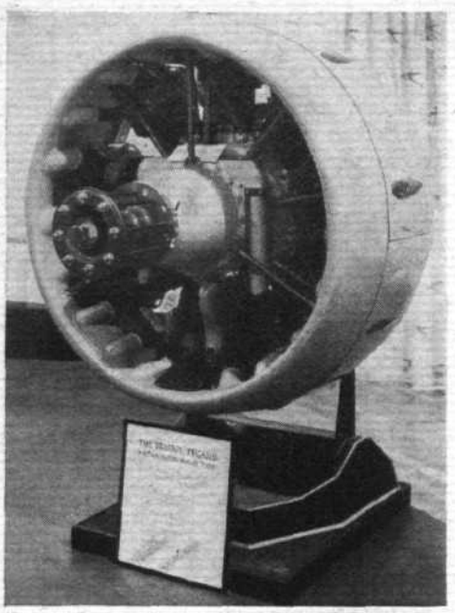
SHOWING THEM HOW

Further Impressive Views of the Hawker Monoplane.

FROM all reports it seems that the new Hawker monoplane single seater fighter is acting as an eye-opener abroad, at least in those countries into which the photographs published in *Flight* last week have penetrated. The views this week serve to show the flowing lines of the fuselage and the size of the machine, which may be gauged from the height of the ground personnel who are wheeling it out so that Flt. Lt. Bulman may contribute another half-hour's flight testing to its steadily increasing aerial experience. The front view gives some idea of the sturdy undercarriage, the wheels of which retract slightly rearward as well as upward, supposedly to to clear a spar. (*Flight* photographs).



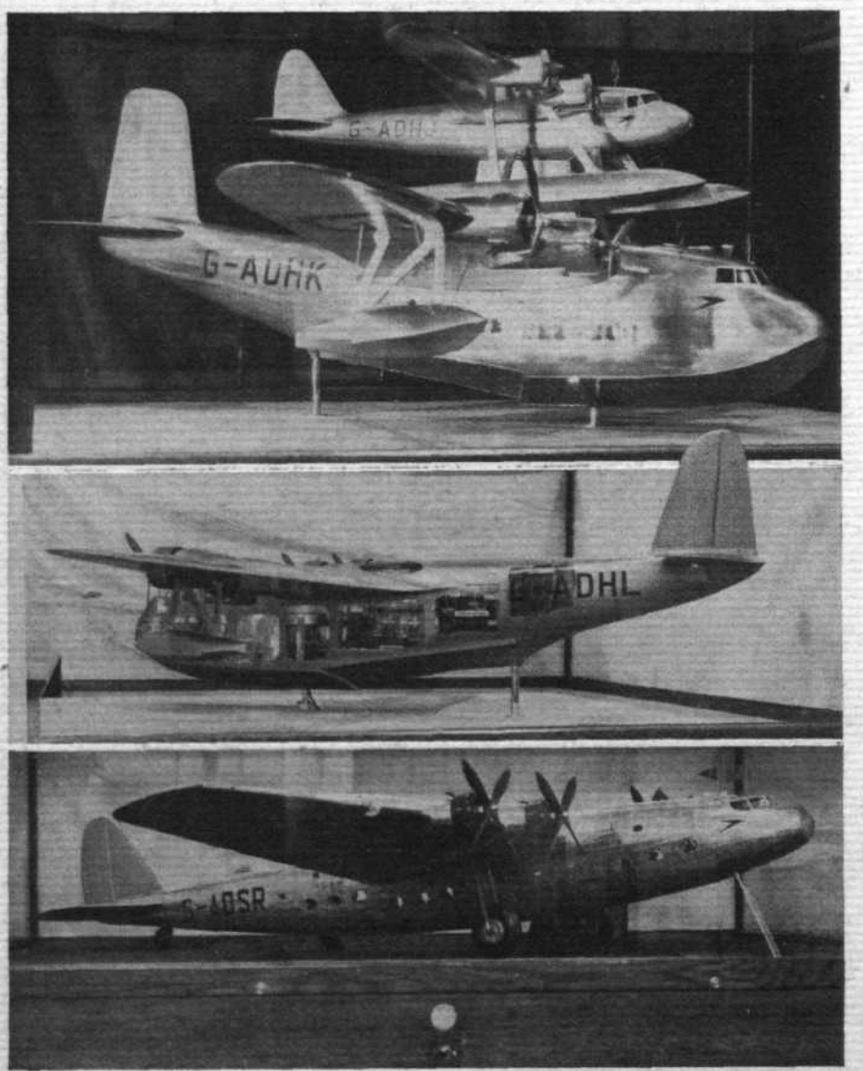




Although covering no very great floor area, the exhibition is full of interest for those who are vague about the state of development reached by Imperial Airways —and, for that matter, for those who are not. In this view it is apparent that the Marconi exhibit (shown on page c) is a centre of attraction. The right-hand picture shows a Bristol Pegasus X moderately supercharged radial (920 h.p. for take-off) of the type which is likely to equip the new Short boats. (*Flight* Photographs.)

AIR TRANSPORT IN MINIATURE

The Empire Airway Exhibition at South Kensington : Past and Future Developments in Model Form



WHETHER the visitor is connected with the air transport business, or is merely an interested onlooker, the compact Empire Airway Exhibition at South Kensington cannot fail both to instruct and interest.

The working models dealing with aerodynamic development, traffic control and radio formalities will give the newcomer an idea of how things have been and are being done, while the most attractive scale models of past, present and future types should seal his interest and faith in air transport generally.

In particular, the cut-away models of the new Empire types—the A.W.27 monoplane and the Short flying boat—and of the Short-Mayo composite machine for Atlantic experiments will give the visitor an idea of the luxury of Empire air travel in the very near future. For those who are not sufficiently impressed by these there is a "peep-show" giving a very comforting view of the interior of one of the new boats. The fact that there are *two* flights of stairs should impress even the *most* phlegmatic! The models, incidentally, were made by the Model Transport Company.

Flying boat development from the scientific point of view is dealt with by means of a model (and working) tank for the testing of hulls and floats, while

The new "big stuff" represented by models. Reading from the top the machines are: the Short-Mayo composite machine, the Short Empire flying boat, and the Armstrong-Whitworth monoplane (which, incidentally, will be fitted with four Tiger VI's of 760 h.p.). (*Flight* photographs.)

An eloquent display of models demonstrates the progress made in the matter of flying equipment. It is more than up-to-date, for it includes the Armstrong-Whitworth monoplane, which has not yet been completed. (*Flight* photo.)

a miniature wind tunnel has been erected in order that the visitor may again realise something of the work that goes on quietly in the background. Drag, lift and pitching moments are all suitably registered on dials, and the uninitiated will learn for the first time that models are usually held inverted during such tests. The power unit demonstration consists of a sectioned Armstrong Siddeley Tiger, which is in continuous motion, a Bristol Pegasus X, a D.H. Gipsy Six, and a Napier Rapier.

Dealing with actual air line operation, a subject which will probably interest the casual visitor as much as anything in the exhibition, there are profile maps of both the Australian and the South African routes, maps of all the Imperial routes, and dioramas of Shargah, Karachi and of the new Rand (Johannesburg) airports.

One of the more interesting static exhibits is the large model of a combined land and sea airport—which may or may not appear in a different form somewhere on the south coast. Models of airport lighting equipment by Chance Bros., consisting of a three-lamp stationary floodlight and a boundary light, as well as a complete working model of Croydon Airport by night, are also shown.

Finally, and most interesting of all, is the Marconi Company's diorama, with map, photographs and loudspeaker, which, at the touch of a button, reproduces a conversation between a pilot and the control tower while bearings are being obtained and a "fix" obtained. This exhibit will probably be worn out before the exhibition finally closes on January 31!

A *Fitting Inscription*

Surrounding the walls and at all available parts are a series of exceptionally fine photographs, and the words of the late Col. T. E. Lawrence dominate the exhibition: "The conquest of the air seems to me to be the only major task of our generation."

The exhibition was opened by Viscount Swinton (formerly Sir Philip Cunliffe-Lister), Secretary of State for Air, on Thursday of last week, with Sir Eric Geddes, chairman of Imperial Airways, in the Chair. Sir Eric, referring to the civilising influence of air transport, mentioned that the routes of Imperial Airways pass through no fewer than twenty-nine different countries.

Viscount Swinton mentioned that Imperial Airways had been criticised in some quarters, but paid a very high tribute to the work the company had done in the past. He expressed his great personal indebtedness to the company for the way in which it had looked after his wife when she was rushing to his bedside during his severe illness. The final verdict on air transport rested with the travelling public, and, judging by results, that verdict appeared to be satisfactory.

Speaking of the future, the Secretary of State for Air said that when the new services came into operation they hoped to have four or five services a week to India, three to Singapore and Hong Kong (already linked by experimental flights), two to Australia, and two to South Africa. He pointed out that Imperial Airways had cost the Government less for every ton-mile flown than had any other national subsidised service.

Sir John D. Siddeley, in moving a vote of thanks to the Secretary of State for Air, said that as one who had been intimately associated with the work of Imperial Airways from the beginning, he felt that much of the success was due to the sympathetic help received from successive Air Ministers. He thought that a very fair balance had been struck between excessive cost to the taxpayer and necessary aid to the company, so that Imperial Airways had been able to carry out its work efficiently.

Col. E. E. B. Mackintosh, Director of the Science Museum, seconded the vote of thanks.

Much ingenuity has been displayed in the construction of this Marconi exhibit, which shows, visually and by means of a loudspeaker, what happens when an Imperial liner on the cross-Channel service is flying above the clouds. (*Flight* photograph.)

Private Flying

Topics of the Day

Group Economy

IN the issue of October 3 I suggested that some form of "competency certificate"—enabling a pilot of one club to fly similar machines at another club—might be a reasonable proposition. Now it appears that such an arrangement may be arrived at for one particular area.

During the initial discussions concerning the proposed Yorkshire Association of Flying Clubs, one of the advantages suggested was that a scheme could be devised whereby a member of one club in the Association might fly any machine owned by another.

More important, however, were the suggestions for group insurance and for the organisation of serious night flying training facilities and of better flying meetings. Few club members can afford the night instructional rates which, when such instruction is carried out on a small scale, are necessarily high. A group scheme would reduce both the number of machines involved and the total number of hours during which special insurance cover would be necessary.

Night Flying

THE majority of experienced club pilots are possessed of the desire to "have a crack" at this night flying business. The idea is appealing partly because the experience would be new and partly because some hope one day to be private owners, and, in that capacity, would have no desire to be entirely confined to daylight operations when more and more aerodromes are properly equipped. Sooner or later, if a private machine is to be of real value, night flying must become a more normal thing.

At that, I will confess to have flown only as a passenger during the hours of darkness, and only once have I put in a really useful number of hours (five and a half) at a stretch. The experience was all the more interesting because, swathed, harnessed and be-parachuted, I sat in the tail cockpit of a Vickers Virginia.

With a pocket torch and a series of strip maps I had not the least difficulty in picking up landmarks on our way from Boscombe Down to St. Catherine's Point, Brighton, London and home to Boscombe Down, though for about an hour, at different times, we were flying above the clouds in the moonlight. In fact, by studying the disposition of the black spaces made by the Thames, Regent's Park, Battersea Park and Hyde Park, I had London properly orientated, while the pilot himself, with whom I could talk, was still in a mental flat spin after coming through the clouds.

Problems to be Solved

OF course, flying in good visibility over country with some useful landmarks is not quite the same as flying over featureless country in conditions of poor visibility, but even on the way back I managed to keep track of the towns and villages without a great deal of trouble.

The whole point is that night flying is not necessarily the terribly difficult and frightening thing that it is sometimes made out to be, provided always that no serious navigational mistakes are made and that the weather does not suddenly close in on one. I should hate to find myself flying in heavy rain without radio and fifty miles from the nearest aerodrome with a permanent staff and floodlighting equipment.

As for making forced landings into "black patches"—I've seen too many power cables about the place to be anything but terrified at the mere thought. I should want a selection of parachute flares, whether they set fire to haystacks or not, and a couple of landing headlights for the final hold-off.

In good weather I have watched an experienced pilot making successive thistledown landings down a very inadequate flare path with the help of a single nose-light, but anything resembling a ground mist makes such a light more or less useless.

For the present at any rate, cross-country night flying in bad weather can only be considered as really safe with two engines and a fool-proof fuel system, radio and a pilot with lots of experience. Nevertheless, I look forward to taking some night-flying dual.

Windscreen Troubles

JUDGING from experiences in the Virginia "sting," the ideal small type for serious night work would be an open pusher. Windscreens can be a nuisance, and even an engine can seriously restrict the useful view just when this is not too brilliant in any case.

During the summer I left Croydon in the dark one morning seated magnificently in the prow of a commercial machine. The view was good, in theory, but the very light rain which was falling must have made things very difficult for the pilot. Only a month ago I was flying a cabin machine with the screen rather a long way off; when some very fine rain fell the forward view was virtually zero and I had to judge my holding-off height by peering through the side windows. The landing was as poor as one might have expected it to be.

Once upon a time an Imperial pilot, flying high, suffered a steadily frosting screen. The weather was very bad, so he concentrated on his instruments and came into Croydon on D/F bearings. When he was due to come in the screen was still darkly opaque. The weather, he thought, must be awful. Presently he called for the steward and asked for hot water.

The screen was thawed. A winter sun shone out of a cloudless sky.

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

HANWORTH

THE Vultee, which has been making Hanworth its headquarters in England, left during the early part of last week for a business trip to Europe. The machine is expected to return a few days before Christmas for a short stay.

Last week's flying time totalled 16 hr. 50 min. Messrs. Peckham and Raymond have become members.

PORTSMOUTH

During the week ended December 1 flying was possible only on four days, but a total of 26 hr. was recorded. Mr. Yelf qualified for his "A" licence, Mr. J. K. Buchanan went solo, and Mr. B. Pugsley has joined the club.

SALISBURY

The Wiltshire School of Flying recorded 13 hr. 20 min. flying during the week ending December 4. Mr. K. R. Brooke, of the Royal Tank Corps, took his "A" licence and Mr. H. A. Shotter has joined the School for a blind flying course. The Miles Hawk Trainer was demonstrated recently.

BROOKLANDS

The aerodrome is still more or less waterlogged and at present the northern and eastern sides are the best for landing. Miss Lethbridge, O.B.E., Mr. Usher and Mr. Pratt have joined the club to take their "A" licences, Mr. Morton, of Olley Air Services, is taking a course of instrument flying under Capt. Findlay, and Miss Betty Malcolm has taken delivery of her Leopard Moth with all new accessories.

Last Sunday two Aeroncas came over from Hanworth and were flown by several Club members, who thoroughly enjoyed the experience. A flying club staff dance was held last Friday. Members are reminded that there will be a "tramps party" on December 14.

LANCASHIRE

The Lancashire Aero Club has secured the services of Mr. Malcolm Ogilvie-Forbes, who has returned from Canada where he has been instructing with the Montreal Light Aero Club and the Curtis-Reid school of flying. Mr. C. Lumsden, a director of the Wiltshire School of Flying, took over temporarily while Mr. Forbes was on his way. Ninety-five hours' flying was recorded last month, aerial activity being limited by high winds and fog. There are several new members, and recent first soloists include J. Williamson, F. Gash, P. Tilford and J. S. Taylor. There is great activity in the blind flying section and Mr. McMurdo qualified in seven days.

About three hundred members and friends attended the ball at the Midland Hotel at Manchester on November 22.

CINQUE PORTS

Exactly thirty hours' flying was registered last week. Mr. G. Adams went solo and Mr. Peter Tomlinson became a member. Mr. Walter Brown has bought a Salmson-engined Klemm, formerly the property of Mr. Scott-Taggart, and Lord Kildare has purchased Mr. Prendergast's Leopard Moth. Fog at Croydon has brought many air liners into Lympne lately. Mr. Vaughan Fowler passed through *en route* for India and the Near East, where he will advertise the wares of the British Aircraft Manufacturing Co. Miss Jeanne de Casalis was flown to Bristol by Mr. A. J. S. Morris in order to attend the dinner of the Playgoers Club. The instructors had a practice formation flight on Saturday to celebrate the birthday of Mrs. W. E. Davis.

The club will be closed on Christmas Day but open on Boxing Day and closed from December 31 until January 2 inclusive.

HERTS AND ESSEX

There were two non-flying days during the fortnight ending December 4, but 78 hr. 50 min. flying was done. Bahman Bakhtiar went solo, W. H. Davey completed the tests for his "A" licence, and Messrs. Fenton, Espiaube, Hughes and Naralkar became members.

SOUTH COAST

Fair weather last week permitted only fifteen hours of flying. On Sunday Mr. Cracknall completed his "A" licence tests and Mr. Kearney went solo. Mr. Llewellyn of the ground staff renewed his licence. New members include Messrs. Porter, Scoular, Marshall-Jones, Haldon and Flt. Lt. Rowe.

TOLLERTON

Eight hours and ten minutes of last week's flying total of 21 hr. 55 min. were flown by the Club's new Hornet Moth, which was brought from Hatfield to Tollerton by Capt. L. W. Hall on Sunday. Mr. C. S. Simkins has enrolled as a flying member, Mr. K. Bee has transferred from associate to flying membership, and Mr. G. A. Hoffen has become a member.

CAMBRIDGE

Flying times recorded by Marshall's Flying School and the Cambridge Aero Club for the week ending December 7 amounted to 34 hr. 20 min. Messrs. Maufe, Boden, Le Breiully and Aykroyd have completed the tests for their "A" licences and three other members are trying to complete theirs before the end of this week. First solos have been made by Messrs. Druce and Howard.

YAPTON

Sixty-four hours twenty minutes were logged during November by the Yapton Aero Club. The following have become members and are under instruction for their "A" licence: Messrs. C. S. B. Irwin, P. H. Alington, A. Pringle-Fraser and Miss M. Marshall. Mr. Irwin and Miss M. Gill have passed their "A" licence tests.

The landing competition on November 9 was won by Mr. N. P. Ewart. Miss M. Gill and Mr. S. Ganthony were second and third respectively. Mr. P. H. Alington broke the club record by going solo after only 2.05 hours of dual instruction—which must be something like a record for any club.

CARLISLE

The first annual ball of the Border Flying Club, held on November 29 in the Crown and Mitre Hotel, Carlisle, proved to be a huge success. Several members of other clubs in various parts of the country had signified their intention of flying to Carlisle for the function, but unfavourable weather conditions prevailed and only three machines, with six members of the Irish Aero Club, of Cork, arrived.

The company numbered 320, and among the guests were Lord and Lady Carlisle, Brig.-Gen. Spears, M.P. for Carlisle, and Mrs. Spears. Several novel features were introduced during the course of the evening and numerous flights were awarded as prizes. Included in the scheme of decorations was an illuminated model of the club machine and this was suspended in the centre of the ballroom, producing a striking effect.

The prizes were presented by Lady Carlisle, who is a keen member of the Border Flying Club. During supper an excellent cabaret was staged.

BANQUET: At the Herts and Essex Aeroplane Club's dinner and dance: With Mrs. J. A. Mollison, the joint president, can be seen Mr. F. E. Darlow, who was in the chair, and Mr. Tom E. Davies, J.P. (right), who acted as toastmaster; Cmdr. H. E. Perrin, of the Royal Aero Club, is on the left.

Private Flying

CARDIFF

During the greater part of last week flying was practically impossible and only six hours were logged.

C.A.S.C.

The ten members who flew on Sunday put in four hours' dual and one hour solo. Mr. P. W. Roberson, of No. 3 (Cams) Squadron made his first solo.

REDHILL

Blind flying certificates have been issued to Messrs. Beaumont, Steele, and Frost. One new member is taking an *ab initio* "B" licence course. Last week's flying time amounted to 70 hr. 15 min.

LIVERPOOL

Flying was seriously curtailed last week by wind and fog. Mr. L. Dayan has taken over the secretaryship of the club. An informal dance will be held at Speke on Saturday, December 21. The Club will be closed from December 23-26 inclusive.

YORKSHIRE

Bad weather has been experienced generally and flying times last week were kept down to 12 hr. 45 min. Mr. J. L. Macalpine took delivery of his new Hornet Moth, Mr. H. L. Brook came over from Sherburn, and Mr. E. Martin Smith joined as an associate member.

Through the kindness of Mr. W. Adams, a member, a film show of aeronautical interest was given on Sunday evening, December 8.

READING

Invitations to the first of the winter season's dances held on November 30 read, "Come dressed as you would be in Piccadilly on King's Cup night," and several of the ninety members and guests who were present took advantage of the offer. Another original dance will be held towards the end of January.

The Night Hawk was flying all last week and has passed its final tests. New pupils are Messrs. W. North Lewis, Lungdale, Miller, Hoffman and Godfrey. Dr. Bradbrook has qualified for his "A" licence and Mr. Vishvarath has passed his blind-flying test.

KENT

In the face of continual bad weather 75 hr. were flown during November and Mr. Newman has made his first solo flight. The club will be closed from Monday, December 23, until Saturday, December 28.

NORFOLK AND NORWICH

A few days ago a highly interesting debate was held at the club, the subject being the ideal machine for club flying. A supper dance was held last Friday and there will be another on New Year's Eve. At 8 p.m. next Sunday Mr. John Grierson will give a lantern lecture, "The First British Arctic Air Route Flight."

BRISTOL

Mr. T. K. Breakell, of Crilly Airways, completed a blind-flying course and tests with the club last week. Messrs. R. K. Archer and H. Blount became pilot members and Mr. T. S. Jones passed the tests for his "A" licence. In view of the appalling weather conditions last month the total of 64 hr. 40 min. flying must be considered satisfactory.

LEEMING

Yorkshire Aviation Services has now been formed into a club and the registered name of the new company is Yorkshire Aviation Services Country Club, Ltd. Mr. J. M. Barwick, M.F.H., and W. Liversidge, M.D., are directors. Leeming aerodrome will be closed between December 22 and December 30, both dates being inclusive. Petrol and oil will not be available between these dates.

NEWCASTLE

Four "A" licences were obtained during November, the recipients being Dr. J. A. Neilan, Dr. J. Taylor, Mr. J. B. Woodeson, and Mr. A. R. F. Mackie. Mr. H. Mitchell and Mr. E. C. W. Beale obtained their "B" licences. Flying times were dual 23 hr. and solo 26 hr. 30 min. Mr. G. L. A. France took delivery of his new Hornet Moth. Badminton and clay pigeon shooting were in full swing during the poor weather.

Hampshire's Tenth

WHEN a flying club organises a *tenth* annual dinner only a very minor piece of mental arithmetic is necessary to show that the club, in this case the Hampshire, was one of the very first to be formed after the subsidy scheme had been initiated. Certainly, the Hampshire Aeroplane Club carries on quietly but firmly year after year, and only at its annual dinner does the outsider obtain a chance of discovering how the good work is progressing.

Since last year's event Southampton aerodrome has become an airport with real night-flying equipment, so, as Mr. S. Scott-Hall explained in his reply to the toast of the club, they will be able now to give night-flying instruction. Mr. F. D. Bradbrooke, in proposing this toast, very rightly explained the real objects of club flying, and suggested that the light aeroplane clubs would need to give serious attention to the ultra-light aeroplane since this type enabled people to fly who could not otherwise afford to do so. Mr. W. L. Gordon, the secretary, toasted the guests, who were many and notable, and Alderman T. H. Sanders, the Mayor of Southampton, replied. The Rev. E. Bruce Cornford, of course, was in the chair, and Comdr. H. F. Perrin explained his versatility while proposing his health.

During the evening both Sir Rupert Brickwood and Mr. Bradbrooke regretted the departure of the erstwhile chief instructor, Mr. Dudley, and the first-named explained that a presentation would be made to him. A certain Mr. H. M. Bateman (not present) might add one other drawing to his well-known series and entitle it, "The Toastmaster who made the wrong announcement." He had, in fact, reached the words "be upstanding" before he realised that he was on the wrong track! Even toastmasters must make mistakes now and again, despite their aloof magnificence.

The Aviation Club Opens

ON Wednesday of last week Sir Harry Brittain officially opened the Aviation Club in a room so crowded with members and visitors that one obtained the idea that the accommodation might need, even now, to be expanded almost immediately.

Actually, of course, this pleasant little club in Albemarle Street has been in action for some time, but an "official opening" always makes a real start. Members of the little-known Skaal Club—for travel people only—are elected for a purely nominal membership fee, and it might appear that there is room in London for such a rendezvous as the Aviation Club in order that, as Sir Harry explained, the younger people in the flying movement, who could not afford high membership fees, might "get together."

Nine Trophies

THE number of cups and the like which were presented after the fifth annual dinner of the Herts and Essex Aero Club by Comdr. H. E. Perrin must have been just about the finest to be seen at any club gathering.

In addition to the eight presented in the main for cross-country competitions, details of which have been given from time to time in the club page of *Flight*, there was also the Club Championship Competition for the Woodside Cup, and the winner of this remained in doubt until the moment of presentation—though it was obvious that the winner lay between two of the more successful members. After marks had been given for the various competitions, the winners were taken up for a final test in pin-pointing and forced landings by Mr. Roger Frogley, who made a final decision. Mr. W. S. Dack was the winner, with Mr. V. A. Ercolani as a very close runner-up.

During the dinner at the Park Lane Hotel Mr. F. E. Darlow was in the chair, and Mrs. J. A. Mollison, the joint president, flew over especially from Paris in order to be present. During the speeches, which indicated some startling oratorial abilities among both members and visitors, Mr. Darlow explained that the club had already flown nearly 200 hours more this year than in the whole of last year, and that the accommodation both for man and machine at Broxbourne had been greatly improved.

The Egyptian Meeting

INTENDING competitors in the Third International Egyptian Aviation Meeting are reminded that entries close on January 15, 1936. Conditions and entry forms may be obtained on application to the Royal Aero Club, 119, Piccadilly, London, W.1.

At the present time it is almost certain that the meeting will take place, as the Aero Club of Egypt, in a letter to the Royal Aero Club, dated December 1, indicates that certain entries have been received and asks for the British entries to be sent as soon as possible.

For the Olympic Winter Games, 1936

THE Royal Aero Club announces that in connection with the Olympic Games at Garmisch-Partenkirchen from February 6-16, 1936. the Aero Club von Deutschland is to organise an international rally, particulars of which will shortly be available. In the meantime any British air tourists wishing to take part are requested to notify the R. Ae. C., 119, Piccadilly, London, W.1.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

A TALE OF TWO CITIES

[3091] My attention has been called to an article in *Flight* of November 28 under the heading of "The Outlook," referring to a certain North of England city airport scheme.

As the Liverpool Airport is the only North of England airport scheme where the sum of money mentioned by you, viz., £250,000, is the estimated expenditure, I am writing to ask you to be good enough to make it perfectly clear to your readers that the article in question cannot possibly refer to the Liverpool Airport.

For your information, I may add that the work originally contemplated has certainly *NOT* been abandoned, but, in fact, is actually in progress and a very considerable portion completed. A very large sum has been expended on the landing ground, and the work on the additional area to be taken in, to give a total area of 418 acres, is now in progress.

The obstruction lighting of all buildings in the vicinity is completed and actually in use at the present time. Boundary lighting and floodlighting is practically finished. The control tower is nearing completion and the radio beacon is expected to be completed at an early date. Contracts for the control buildings, tower and hangar, garage, workshops, etc., are actually in hand and are being pressed forward for completion at the earliest possible moment.

In addition to this work two new approach roads have been made on the estate for the purpose of giving better transport facilities between the airport and the City.

Municipal Buildings, Liverpool 2. WALTER MOON, Town Clerk.

[3092] As a regular reader of *Flight* I am very sorry to observe the "Outlook" paragraph under the heading "Putting the Cart First," which appeared on page 549 of your issue of November 28.

Obviously, this paragraph relates to the City of Hull, and I would remind you that the provision of an adequate airport is a very serious proposition to the ratepayers of any locality.

On the other hand, it is not true to say that the scheme for a larger aerodrome has been abandoned. Indeed, the project is still very much alive, and I feel sure that the Corporation will make a very definite move in this direction as soon as the horizon of civil aviation in the industrial north is a little clearer.

I believe no municipality can vie with Hull both in enthusiasm and work for the promotion of air transport, and K.L.M. themselves stated that nowhere did they meet with such wholehearted co-operation as they received at the hands of the Hull Corporation.

It may be true that the use of air services is a habit which grows only slowly with the people in the north of England, but when that habit has become fully developed it will in no small measure be due to the persistent advocacy of the Corporation of the Airport of Hull.

The South cannot appreciate the great difficulties which have confronted the industrial North for many years past, and whilst we are not lacking in enterprise we are compelled to measure our commitments very carefully.

Guildhall, Hull. FREDERICK TILL, Lord Mayor, Chairman, City of Hull Development Committee.

[The above two letters explain themselves, and also our paragraph. Apparently it is a coincidence that the estimated expenditure of £250,000 is identical in both cases.—Ed.]

"CRASHPROOFING" THE PILOT

[3093] I was interested to read "M. R.'s" letter [3088] in the British Aircraft Industry number of *Flight*. While the point he raises is quite feasible, one would scarcely call it a "serious disadvantage." The possibility of a low-wing cantilever monoplane turning over is so remote as to preclude the possibility of it having any psychological effect on the pilot. This is due mainly to the smaller rolling moments about the longitudinal axis of this particular type of aircraft.

If "M. R." has watched a low-wing monoplane landing under varying conditions he will appreciate my point.

Newcastle-on-Tyne. B. NICHOLLS.

CHELSEA COLLEGES CELEBRATE

TO hear an ex-Air Minister likening himself to a seaplane was the somewhat unusual experience enjoyed by the hosts and guests at the annual dinner and dance of the colleges of automobile and aeronautical engineering at Grosvenor House, London, last week.

Captain Guest, deputising for Lt.-Col. Moore-Brabazon, was alleged to be responding to the chairman's toast "The Automobile and Aeronautical Industries," but appeared not too certain of his place in the scheme of things. He began by saying that he always liked an opportunity to get up and talk aviation and claimed that it was impossible to have a successful aeronautical industry without training colleges such as that at Chelsea, over which the chairman of the evening, Mr. C. H. Roberts, presided. After causing a good deal of amusement by mentioning that he felt like a seaplane floating on the bosom of Mr. Handley Page, who would afterwards correct all his mistakes, Capt. Guest paid a tribute to the work of Imperial Airways, finishing up by expressing his pleasure at the expansion of civil aviation mentioned in the King's speech, and repeating the old fallacy that Britain's air defence rests on strong civil aviation.

A. S. M. Wedderburn, who, as a student at the College of Aeronautical Engineering, won the Mollison Trophy for 1935-1936.

Mr. Handley Page, who was at the top of his form, said that, like Capt. Guest, he also enjoyed talking to so many publicists. He pointed out jestingly that technical ability was of little use, and that what was really necessary was to be able to talk about aviation. A course in speaking was essential to the ability to *sell* aviation. Concerning Capt. Guest's reference he would point out that the essential function of a seaplane was not to rest on the sea but to "get off"!

Becoming, with difficulty, more serious, Mr. Handley Page called attention to the way in which aviation had made the map shrink. When one could go to other European cities at 200-250 m.p.h., distance in miles had ceased to mean anything, and the distance to Australia should be measured in time, not in miles. On that basis Berlin was now nearer to London than Edinburgh was a hundred years ago. He stated that the countries of Western Europe must settle their differences. They had everything worth living for, and it was essential to see that the new power which air transport had introduced was not used against their fellow creatures but with and for them.

Mr. C. H. Roberts, the principal of the Chelsea colleges of automobile and aeronautical engineering, read extracts from a letter from Lord Wakefield, president of the colleges, who was unable to be present, and mentioned that the two holders of trophies for general efficiency, the Kathleen Drogheda challenge trophy on the automobile side and the Mollison trophy on the aircraft side, had been won this year by Mr. F. J. Mansfield and Mr. A. S. M. Wedderburn respectively.

Lord Sempill, in proposing the toast of the colleges, recalled that the College of Aeronautical Engineering was opened four years ago. There were 38 students the first year, 80 the next and 106 this year. One hundred students had entered the industry from the college, and he pointed out that jobs were available for all who were properly trained.

The trophies were then presented by Lady Drogheda, and after a short interval the dancing began.

STRATOSPHERIC TRAVEL

Prof. G. T. R. Hill Explains Some of the Advantages and Difficulties : A Résumé of a Paper Read Before the Royal Society of Arts

The Vickers Vespa (special supercharged Bristol Pegasus) referred to by the lecturer. Piloted by Capt. C. F. Uwins, it gained the altitude record in 1932 with a height of 44,000 ft. An Italian Pegasus-engined Caproni subsequently raised the figure to 47,353 ft.

A LARGE number of strange and not-too-well-known facts — some of which might be denied or doubted by other scientific men—were introduced in the course of a paper read on Wednesday, December 4, before the Royal Society of Arts, by Prof. G. T. R. Hill, M.C., M.Sc., F.R.Ae.S. His subject was the stratosphere, and Prof. Hill, who is the Kennedy Professor of Engineering of London, and will be remembered as the designer of the Westland Pterodactyl, enlivened an already clear and simple exposition with a multitude of sallies and with the help of a series of instruments and diagrams. The Rt. Hon. Lord Sempill, A.F.C., was in the chair.

Before proceeding with the more serious part of his paper Prof. Hill passed quickly over the history of human transport and mentioned a fact which will probably surprise many of the younger generation. As long ago as 1862 Coxwell and Glaisher reached a height of 36,000ft. in a balloon without the help of oxygen apparatus. In comparison our records do not appear to be so remarkable.

The air, he said, was not weightless, and at ground level the atmosphere compressed the lowest strata until each cubic foot of air weighed about as much as four pennies. At 20,000ft. the pressure was reduced to about one-half, at 50,000ft. to one-ninth, and at 200,000ft. to one-five-thousandth of the ground level pressure.

Until about forty years ago it was always believed that the temperature fell continuously in the higher regions, but this conception was overthrown by the observations of Teisserenc de Bort, who sent up small "*ballons sondes*" equipped with recording instruments; he found that, while the temperature dropped more or less uniformly with height until at about 35,000ft., where it has fallen to −55° C., there was no further fall. Thus we might consider the whole atmosphere as being divided into two zones, the troposphere in which the air temperature was falling, and the stratosphere where the temperature was constant, divided by the tropopause, where the temperature pauses in its fall.

The Higher the Hotter

Later observations had shown that the tropopause was much higher nearer the equator. Far up into the stratosphere the temperature actually rose. At 160,000ft. up it was believed to be about as warm as on the ground, and 200 miles up the temperature had risen so much that brass would melt. Concerning the composition of the atmosphere—one-fifth oxygen and nearly all the rest nitrogen—at 200,000ft. there was enough hydrogen present to form a combustible mixture; but the density is only one-five-thousandth part of its ground value.

It was obviously good to fly high; the air was less dense and offered less resistance to motion, but two most important factors in flying namely, clouds and winds, had to be examined. It was not until the 10,000ft. level was reached that we could escape the possibility of continuous cloud. At 30,000ft. we passed through the region where the cirrus cloud, or mackerel sky, floats, and in the stratosphere we were free altogether from clouds, with the rare exception of the very beautiful "nocti-lucent" clouds floating at great altitudes.

Turning to the important question of winds, it was found that in the lower levels the wind speed increased as you got higher. If the wind on the ground was westerly, it grew stronger and stronger, until, just below the tropopause, it might be five times as strong; at the tropopause, just as the temperature change was fundamentally altered, so the wind speed suddenly started to fall, until at 10,000ft. into the stratosphere it had lost perhaps half its speed. Wind direction was of vital importance, especially with the high speeds encountered high up. On the whole, winds tended to be more westerly than they were at ground level; easterly winds, low down, often became westerly. A very rough-and-ready reason was that the winds blew one way because the earth turned on its axis only one way, from west to east.

Both man and engine must breathe to live, and it was interesting to note a difference in their needs. The power of the engine depended on the amount of oxygen it could get into its cylinders at each stroke, and thus the fall of power with height was nearly the same as the fall in density with height; as the result of many measurements it was found that the fall of power was actually about half-way between the fall of pressure and the fall of density. On the other hand, man needed to have his blood saturated with oxygen, and a certain pressure of oxygen was necessary. At 15,000ft. the available oxygen pressure was nearly halved; it fell relatively rather more quickly than the air pressure, owing to the constant pressure of water vapour and carbon dioxide in the lungs. While the power of the engine fell to about half its ground level value at 20,000ft., the power of the human freight, including the pilot, fell to nil.

The Human Problem

Pressure problems, even with oxygen, meant that 46,000ft. was the normal limit when using oxygen apparatus. In 1932 Capt. Uwins, flying a Vickers Vespa with a Bristol engine, broke the altitude record as it then stood by almost reaching the 44,000ft. mark. A year later the record passed to France with another few hundred feet added, while last year Italy captured the record. Donati, using a Bristol engine on his Caproni, added another 2,500ft., and achieved the remarkable figure of 47,360ft. He was in a state of physical collapse on landing.

Just as the deep-sea diver below about 200ft. must be put in a box to protect him from the severity of the conditions, so the pilot, at the 44,000-46,000ft. level must go into a box which will protect him by preventing the oxygen pressure from falling unduly. One of the first attempts to provide such protection was exemplified in the Farman F.1001. Owing to some fault in the design of the pilot's chamber the chamber burst at about 30,000ft., with fatal results to the pilot. It was absolutely necessary to avoid putting the pressure inside a man without putting it outside. Quite a small excess of pressure inside was fatal.

There were two ways of dealing with the pressure cabin; one was to maintain it full of air at ground pressure, or perhaps somewhat less, and the other was to fill it with oxygen, in which case the pressure inside, and therefore the tendency to burst, might be greatly reduced. Even at reduced pressure a pure oxygen atmosphere will support combustion, and this combustion was very vigorous indeed, and the risk might be a fundamental difficulty. Even if the cabin had to be designed

to withstand internal pressure, no really great excess of weight would arise.

Prof. Hill then dealt with modern engine supercharging methods, and explained that a multi-stage supercharger was necessary for higher altitudes. He suggested that the exhaust-driven type might be more suitable for such work, but explained that pipe work would be involved, and that the problem of designing the turbine so that the blades could withstand the combination of a high rate of revolution and a high temperature of something like 700° C. was no mean one. If when flying high the engine was throttled down it might not be possible to get it going again because the centrifugal type supercharger gave very little compression at slow speeds. For this and other reasons it had been proposed to replace the last stage of the centrifugal type supercharger with one of the Roots type supercharger, which would supply a satisfactory quantity of air even at low engine speeds.

The major problems, after supercharging, were those of cooling the cylinders and oil. Although the temperature of the air fell rapidly, the cooling power of the air also depended on the density, and since this was falling, the problem actually became more difficult at really high altitudes than at ground level. Special fuel would probably be used. It must not freeze at the very low temperatures or boil at the very low pressures. According to Ricardo, a bi-fuel system would be worth while. The lubricating oil in the engine had to be specially chosen, and an additional amount of insulation was needed in the ignition system.

Long-distance Economy

It was not until journeys of at least 1,000 miles were contemplated that we could secure much benefit from high flying. What margin was left to carry passengers? Prof. Hill started with a design of passenger transport aeroplane with the following characteristics: Total weight, 9,000 lb.; disposable load, 3,500 lb.; wing area, 600 sq. feet; monoplane wing, span 62 feet, aspect ratio, 6.4; maximum power, 800 h.p.; propeller efficiency under all cruising conditions, 80 per cent., including slipstream loss; and minimum overall drag coefficient, 0.011. He also took the exceptional efficiency in fuel consumption which Mr. Ricardo believed possible, of 0.4 lb. per h.p. hour, and based his cruising speed on a figure of two-thirds of maximum power.

The shortest distance between Newfoundland and Ireland was about 1,850 miles, but owing to the prevailing westerly winds, which were commonly blowing near the tropopause at 100 m.p.h., rising sometimes to 200 m.p.h., it might be advantageous to return by the Azores to Bermuda, where the maximum stage distance was about 200 miles farther. In order to allow for adverse conditions a margin was necessary. What allowance should be made for the superchargers, special airscrew, pressure cabin, cabin heating, and high-altitude equipment? He suggested that 600 lb. might eventually cover it. Although this was not given during the actual delivery of the paper, the following table, in which various designs are considered, is interesting. The D.H. Comet has been taken as the basic ideal for the moment.

This table shows a range of speeds from just over 160 to nearly 300 m.p.h. and a range of useful load from nothing to five passengers. High flying promises the largest gain; heavy loading may be actually disadvantageous high up if it is obtained by reduction of span. Increase of loading normally means increase of parasite drag coefficient, since for the same duty the body must remain nearly the same size.

Design No.	Wing loading.	Wing span.	Aspect ratio.	Min. Drag Coeft.	Height.	Cruising speed.	Duration for 2,050 miles.	Fuel used plus reserve.	Useful load.	Number of passengers.
1	15	62	6.4	0.011	0	162	12.7	3,600	100	—
	15	62	6.4	0.011	40,000	240	8.6	2,430	470	2
2	25	48	6.4	0.015	0	169	12.1	3,450	50	—
	25	48	6.4	0.015	40,000	230	8.9	2,530	370	2
3	25	62	10.6	0.015	0	172	11.9	3,390	110	—
	25	62	10.6	0.015	40,000	252	8.1	2,310	590	3
4	25	48	6.4	0.010	0	193	10.6	3,020	480	2
	25	48	6.4	0.010	40,000	277	7.4	2,100	800	4
5	25	62	10.6	0.010	0	197	10.4	2,960	540	3
	25	62	10.6	0.010	40,000	296	6.9	1,970	930	5

If the heavily loaded machine can be yet further cleaned up in design to approach the racing Comet, it would seem we might be able to look in the reasonably near future for an aeroplane cruising at 275 m.p.h. and capable of carrying four passengers across the Atlantic with 800 h.p. This is, of course, a small unit, and larger sizes will really be needed.

He might, said Prof. Hill, have disappointed those who contemplated travel at 2,000 and 3,000 miles an hour. He had attempted to show that high altitude flying did provide a possible means of increasing speeds with reasonable economy, though the difficulties of all kinds were of a formidable nature. Looking further ahead it was only right to point to one barrier—by no means insurmountable, but, nevertheless, a barrier—impeding future progress; this barrier arose by reason of the fact that the speed of sound in air was only about 700 m.p.h. At the present speeds of flight, every exposed part of the aeroplane pushed what may be loosely called a "bow wave" in front of it. The air, so to speak, received a warning that the aeroplane was coming. At 700 m.p.h. or more, the "wave" could not travel ahead and warn the air to get moving; instead, a "shock wave," much more like the breaking bow wave of a ship, was shed from the foremost part and the flow was altogether different. The curious thing was that objects which were badly shaped at low speeds might be "streamlined" at high speeds.

He had not touched upon the subject of rocket propulsion, which was really wrapped up in speeds much higher than any he had contemplated. Among the many colleagues of Prof. Hill and others who took part in the discussion one or two, at least, should be mentioned.

One was that veteran aeronaut, Mr. Griffith Brewer, who is still to be found in the air. He spoke of ballooning experiences and mentioned an occasion when a certain scientist, who was with him on one trip, proved conclusively—to himself, at least—that matter became less heavy with height!

Capt. J. Laurence Pritchard, the secretary of the R.Ae.S., began his contribution by being distinctly unkind to the lecturer, but he warmed up to his work. He doubted whether Prof. Hill's suggestions that unfrozen water was to be found at really great heights was based on fact, whether the temperature rose distinctly above a height of thirty miles, and whether the wind direction could be considered as consistent.

Prof. Hill, in his reply, explained that the water layer theory was demonstrable and spectroscopic photography made the theory appear as a fact, and the increase of heat, too, was rather more than a theory. His statements concerning wind direction, of course, could only be considered as generalisations.

Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in the list.

Dec. 16. R.Ae.S. Lecture: "Wireless and its Application to Commercial Aviation," by Capt. J. M. Furnival, 6 p.m., Institution of Electrical Engineers.

Dec. 19. R.Ae.S. (Coventry Section) Lecture: "The Stratosphere," by Capt. J. Lawrence Pritchard, 8 p.m. Armstrong Siddeley Canteen.

Dec. 20. London Aeroplane Club. Annual Ball, Park Lane Hotel, London.

Dec. 21. Brooklands Aviation Ltd., Annual Dinner.

1936.

Jan. 16. R.Ae.S. (Coventry Section) Lecture: "Development in Centrifugally Cast Piston Rings for Modern Aero Engines," by Mr. P. R. Twigger, 8 p.m., Armstrong Siddeley Canteen.

Jan. 22. Royal United Service Institution Lecture: "The Expansion of the Royal Air Force," by Air Marshal Sir C. L. N. Newall, at 3 p.m.

Jan. 30 and 31. Aerodrome Owners' Association: Annual Conference and Aerodrome Equipment Exhibition, British Industries House, Marble Arch, London.

Feb. 12. Yorkshire Aviation Services Country Club. Dinner and Dance, 8 p.m., Grand Hotel, Harrogate.

Feb. 20. R.Ae.S. (Coventry Section) Lecture: "Variable-pitch Propellers," by Mr. T. E. Beacham, 8 p.m. Armstrong Siddeley Canteen.

Feb. 28. Bristol and Wessex Aeroplane Club: Annual Aviation Ball.

Mar. 10. Royal United Service Institution Lecture: "The Development of Civil Aviation," by Lt. Col. F. C. Shelmerdine, at 3 p.m.

Mar. 19. R.Ae.S. (Coventry Section) Lecture: "Type-Testing an Aircraft," by Flt. Lt. Bulman, 8 p.m., Armstrong Siddeley Canteen.

April 16. R.Ae.S. (Coventry Section) Lecture: "Aircraft Instruments," by Mr. J. E. Chorlton, 8 p.m., Armstrong Siddeley Canteen.

May 15—June 1. Stockholm Aero Show.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

DWINA (UP-RIVER) RELIEF FORCE 1919, REUNION DINNER

The seventeenth reunion dinner of the naval, military, and air forces which served up-river in connection with the relief operations on the North Dwina, in 1919, will be held on Saturday, December 14, at the United Service Club, Pall Mall, London, S.W.1. Officers who have not yet received notices are requested to communicate with the honorary secretary, c/o The Royal United Service Institution, Whitehall, London, S.W.1.

QUETTA EARTHQUAKE REWARDS

To the list of honours conferred by H.M. the King for services in connection with the Quetta earthquake, in our issue of November 28, the following should be added:—

B.E.O. Medal (Mil.) for Gallantry.

L.A/C. Norman George Breadon.

B.E.O. Medal (Mil.) for Meritorious Service.

L.A/C. Joseph John Wickenden.

R.A.F. BENEVOLENT FUND

The fifth Council Meeting of the year was held at Iddesleigh House on Wednesday, December 4. The Viscount Wakefield of Hythe was in the chair. The Chairman welcomed the return of Air Vice-Marshal C. A. H. Longcroft, C.B., C.M.G., D.S.O., A.F.C., as a Member of Council, and as a Member of the Grants Committee. The Hon. Vincent Massey, High Commissioner for the Dominion of Canada, was elected a Vice-President of the Fund. Dame Helen Gwynne-Vaughan, G.B.E., D.Sc., LL.D., tendered her resignation, but was invited to continue as a Member of Council and Deputy Chairman of the Fund. Lt. Comdr. H. E. Perrin retired in accordance with the rules of the Fund, and the thanks of the Chairman have been conveyed to him on behalf of the Council in appreciation of his valuable help to the Fund both as Chairman of the Grants Committee and as a Member of Council over a long period of years. Air Comdre. B. C. H. Drew, C.M.G., C.B.E., has consented to act as Hon. Treasurer of the Fund, Chairman of the Finance Committee and Chairman of the Grants Committee, during the absence of Mr. Walter S. Field on account of illness.

Donations received for the year ending 1/12/35 amount to £15,737 12s. Expenditure for the year ending 1/12/35 on relief alone amounts to £18,267 1s. 7d. The number of applications dealt with during the year ending 1/12/35 amount to 1933, representing an increase of 56 over the previous year. It is of interest to note that this total includes 1,344 war cases, an increase of 97 war cases over the number dealt with in 1934. All the above statistics refer to the Council year ending 1/12/35. It is anticipated that the statistics showing the very high expenditure upon relief will be very similar for the financial year ending December 31, 1935, of which details will be recorded later in the annual report.

R.A.F. CRUISE TO JAPAN

With the permission of the Japanese Government arrangements are being made for a squadron of the Royal Air Force to carry out a flight from Singapore to Japan. This will be the first visit of a Royal Air Force Squadron to that country.

The cruise will be undertaken by No. 205 (F.B.) Squadron, equipped with Short Singapore flying boats. It will begin about the middle of February, and will be completed in the second week of March. The length of the round flight will be approximately 7,000 miles.

The route for the outward journey will be:—Singapore-Kuching (Sarawak)-Kudat (Sarawak)-Manila (Philippine Islands)-Hong Kong-Amoy (China)-Shanghai-Kagoshima-Tokyo, Takyama, or some other place approved by Japanese Government.

The Squadron will remain in Japan for about a week and on the return flight will follow the same route to Hong Kong. From there it will proceed via Kam Ranh Bay (Cochin China) to Singapore. Air Comdre. S. W. Smith, O.B.E., Air Officer Commanding, Royal Air Force, Far East, will accompany the Squadron, three flying boats being employed with a total crew of twenty-five officers and airmen. Facilities are also being sought from other Governments to enable the Squadron to fly over and alight at ports in their territories.

VACANCIES FOR BOYS

The Air Ministry announces that 300 vacancies will occur in February next for Boy Entrants for training as wireless operators, armourers and photographers in the Royal Air Force. Particulars can be obtained from the Air Ministry (Boy Entrants Dept.), London, W.C.2. The number of vacancies includes the increases necessitated by the expansion scheme which is now in progress.

Entry will be open to boys who are between 15¾ and 17¼ on February 1, 1936, and who have attended a secondary, junior technical or central school up to the age of 15½, or have attained an equivalent educational standard. There is no entrance examination, but candidates must be nominated by a recognised authority and present themselves for interview. Accepted boys will be given twelve to sixteen months' training in the particular trade to which they are allotted.

Intending applicants can also obtain details of the scheme and application forms from their headmasters, if still at school. Those no longer at school can apply to the local Ministry of Labour advisory committee for juvenile employment, if one exists, or to the local education authority.

ROYAL AIR FORCE GAZETTE

London Gazette, December 3, 1935

General Duties Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader with effect from December 1:—J. W. Turton Jones, M. H. Ely, B. E. Embry, A.F.C., H. K. Goode, D.S.O., D.F.C., H. F. V. Battle, J. B. H. Rogers, B. A. S. Lewin, W. Catchpole, A.F.C., F. G. A. Robinson, D.F.C., T. Humble, W. F. Dry, A. F. James, H. A. L. Pattison, H. J. Gemmel, A. Leach, M.C., H. G. Rowe, D.F.C., D. D'A. A. Greig, D.F.C., A.F.C., A. F. Scroggs, P. J. R. King, G. H. Russell, D.F.C., A. R. Wardle, A.F.C., F. L. Pearce, W. J. Millen, F. E. Bond, C. A Horn, R. Reay-Jones, H. A. Haines, D.F.C., S. McKeever, D.F.C., C. W. Weedon, J. N. Boothman, A.F.C.

F/O. A. J. Pegg resigns his permanent commission (December 1).

Stores Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader, with effect from December 1:—W. St. J. Littlewood, A. Walters.

Accountant Branch

Flt. Lt. A. C. Lobley is promoted to the rank of Squadron Leader, with effect from December 1.

Memorandum

176992 Cadet J. A. W. Beadell is granted an honorary commission as 2nd Lt., with effect from the date of his discharge.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

J. Pegg is granted a commission as a Flying Officer, in Class C, on resignation of his permanent commission in the Royal Air Force (December 1); P/O. E. Sprawson is transferred from Class AA (ii) to Class C (November 30); F/O. J. E. H. Littlewood relinquishes his commission on completion of service, and is permitted to retain his rank (October 12).

The following relinquish their commissions on appointment to commissions on the Unattached List for the Indian Army (November 14):—Flt. Lt. A. J. L. Hughes, F/O. G. M. Gillan, F/O. D. B. Knapp, F/O. H. G. J. Purcell.

Accountant Branch

F/O. H. C. Roberts relinquishes his commission on completion of service, and is permitted to retain his rank (October 6).

AUXILIARY AIR FORCE

General Duties Branch

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—P/O. E. G. E. Rayner relinquishes his commission on account of medical unfitness (November 11).

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—R. F. Boyd is granted a commission as Pilot Officer (November 2).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain.—L. L. Maclean, to R.A.F. Station, Northolt; to command vice Group Capt. A. H. Peck, D.S.O., M.C., 3.11.35.

Wing Commander.—C. Turner, A.F.C., to No. 23 Group Headquarters, Grantham; for Air Staff duties vice Wing Comdr. E. R. Vaisey, 28.11.35.

Squadron Leaders.—H. L. P. Lester, to No. 7 Flying Training School, Peterborough; for duty as Chief Flying Instructor, 2.12.35. W. E. Purdin, to Electrical and Wireless School, Cranwell; for Administrative duties, 1.12.35. C. R. Strudwick, to No. 7 Flying Training School, Peterborough; for Administrative duties, 2.12.35. J. Whitford, O.B.E., to Superintendent of R.A.F. Reserve, Hendon; for flying duties, 1.12.35. C. H. Stilwell, to Headquarters, R.A.F., Palestine and Transjordan, Jerusalem; for Personnel Staff duties vice Wing Comdr. F. H. Laurence, M.C., 23.11.35.

Flight Lieutenants.—D. H. F. Barnett, to Central Flying School, Upavon, 27.11.35. J. S. Wilkins, to R.A.F. Station, Worthy Down, 28.11.35. K. P. Lewis, to No. 7 Flying Training School, Peterborough, 2.12.35. N. W. F. Mason, to No. 7 Flying Training School, Peterborough, 2.12.35. A. C. Mitchell, to No. 209 (F.B.) Squadron, Felixstowe, 2.12.35. C. F. Sealy, to Headquarters, Air Defence of Great Britain, Uxbridge, 2.12.35. F. P. Smythies, to R.A.F. Station, Gosport, 2.12.35. L. Young, to Home Aircraft Depot, Henlow, 30.11.35.

Flying Officers.—G. H. Denholm, to No. 111 (F) Squadron, Northolt, 22.11.35. D. S. Radford, to No. 1 Flying Training School, Leuchars, 26.11.35. E. J. N. Heaven, to No. 1 School of Technical Training (Apprentices), Halton, 28.11.35. T. Q. Horner, to No. 7 Flying Training School, Peterborough, 2.12.35. J. Ramsden, to No. 1 Flying Training School, Leuchars, 2.12.35. J. Whitehead, to No. 7 Flying Training School, Peterborough, 2.12.35.

Commissioned Engineer Officers

Flying Officer.—F. C. Whenman, to School of Army Co-operation, Old Sarum; on appointment to a permanent commission as Flying Officer (Commissioned Engineer Officer) on probation, 15.11.35.

Stores Branch

Squadron Leader.—E. G. Keeping, to D. of E. Dept. of A.M.S.O., Air Ministry, vice Sqn. Ldr. F. J. W. Humphreys, 29.11.35.

Accountant Branch

Flight Lieutenant.—H. A. Murton, to No. 7 Flying Training School, Peterborough, 2.12.35.

Medical Branch

Squadron Leader.—H. Penman, to Central Medical Establishment, London, 29.11.35; for duty as Medical Officer.

Flight Lieutenant.—J. Hill, to R.A.F. Station, Singapore, 23.11.35.

Dental Branch

Squadron Leader.—G. A. Ballantyne, D.F.C., to R.A.F. Depot, Uxbridge; for duty as Senior Dental Officer, 7.12.35.

THE STORY of the ROYAL AIR FORCE

—in Words and Pictures : A Remarkable Book About to be Published

"SQUADRONS OF THE ROYAL AIR FORCE and Other Units: Their Work in Peace and War." By Maj. F. A. de V. Robertson, V.D., M.A. (Oxon.), Lt. Comdr. C. N. Colson, R.N., and F/O. W. A. Cooke. Illustrated by "Flight" photographs (John Yoxall, chief photographer). Price 7s. 6d. (by post 8s.). Flight Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

"THE most beautiful collection of air photographs ever published." That, we venture to believe, will be the universal comment of all who see the *Flight* book entitled "Squadrons of the Royal Air Force," which is to be published in a few days. The diving Hind on the jacket is an action picture which alone must stimulate the desire to explore the treasures inside the covers, and expectations are immediately fulfilled as the reader turns to the exquisite photogravure frontispiece "On Patrol." Never, surely, before has the majesty of cloud masses been so gloriously portrayed by the aerial camera! The sunlight catches the summits of the great globes of cumulus, while mysterious gloom lurks in the caverns of the clouds. Glimpses of the earth and its meadows down below, and the flight of Wapitis flying across the wonderful background, combine to bring to the eye the exhilaration which only the airman knows.

There are fourteen more full-page photogravure pictures in the book, each in its way a masterpiece. The reader will find it hard to decide which of them is his second favourite: the perfect formation flying of squadrons of fighters and bombers, the grand seascape seen from the flying deck of H.M.S. *Glorious*, the white flying boats thrown into relief by a background of the Ventnor landslip and, again, of the misty Devon coast, the flight of sinister Heyfords winging their purposeful way over a typical English countryside, the running up of a night bomber's engines by the light of flares, and the dive of the squadron of Gauntlets—all are really great camera pictures.

The charm of this book does not end with the full-page photographs. There are over a hundred others of almost equal interest, and many of them of almost equal beauty, scattered throughout the pages. In the space at our command it is impossible to give even a rough idea of the subjects, or even of the ground covered. The reader sees pilots learning their job at a Flying Training School, the beagle pack at Cranwell College, the cooks at work in the Apprentices' School at Halton, a kite balloon ascending, the library at the Staff College at Andover, the wilderness beyond Jordan, fighters attacking bombers and flying boats, parachutes dropping gently to earth, elaborate instruction in the exacting duties of army co-operation, airmen and seamen working together in a squadron of the Fleet Air Arm, and very much else besides. *Flight* is proud to offer this magnificent collection to the public.

The reading matter in the book can also claim to be unique. It is the first attempt ever made to introduce to the public various squadrons of the Royal Air Force as individualities. From the point of view of public interest the Royal Air Force is rather unfortunate in using only numbers to distinguish its squadrons. Many ships of the Royal Navy are familiar to everybody. Not only Nelson's *Victory* is known to the world; Beatty's *Lion* is almost equally familiar, and "Evans of the *Broke*" is a household word. So, too, with the Army; the Black Watch, the Buffs, the "Death or Glory" Lancers: you have only to mention them, and everyone knows what you mean. But numbers are far less easy to grasp. No. 25 (Fighter) Squadron, No. 14 (Bomber) Squadron, No. 2 (Army Co-operation) Squadron—how many of the public could say anything definite about these units? Yet every one of the R.A.F. squadrons has an individuality of its own, and every one has a glorious war record. They deserve to be better known, to be very intimately known, and this book tells the story of over thirty of them.

Though the squadrons are the main theme of the book, almost every other form of R.A.F. activity is described. The organisation of the Service is clearly set forth, and the training system for permanent officers, short service officers, and aircraft apprentices is fully described. A very succinct history of the youngest fighting Service is also included. And last, but not least, official approval has been given to this book by the Foreword written by the Secretary of State for Air.

FOR MOROCCAN POLICE WORK

Interesting Equipment of Three Military D.H. Rapides for the Spanish Government

THE outstanding qualities of the D.H.89, or Rapide, as a military general-purpose type were commented on in an article in *Flight* of November 21 this year, which dealt with the coastal reconnaissance version supplied to the British Air Ministry. Now the Spanish Government has ordered three military 89's. They are for colonial work in Morocco and will be delivered shortly.

In these machines the pilot's cockpit, except for the installation of extra equipment, is similar to that of the civil Rapide.

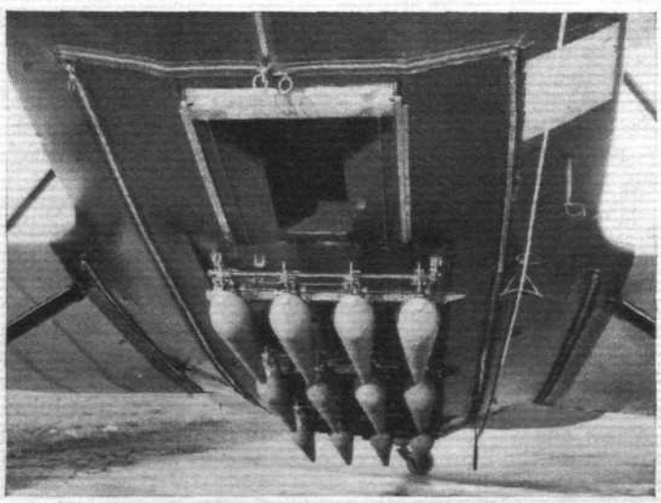
The instrument board is fitted with the following instruments: compass, altimeter, air-speed indicator, Reid and Sigrist turn-and-bank indicator, fore-and-aft level, lateral level, oil pressure indicators, petrol pressure indicator, electric petrol level gauges, electric starter buttons and an electrical fire warning device connected with the engines. Revolution counters are mounted on the engine nacelles. On the right-hand side of the cockpit is a fixed machine gun of the Vickers "E" pattern, with an ammunition box (for approximately 200 rounds) under the seat, which tips forward. A ring-and-bead sight is provided, the ring being inside the cockpit and the bead on the nose of the machine. On the left-hand side of the cockpit are the brake lever, tail trimming wheel and throttle and altitude controls.

Just behind the bulkhead provision is made for the installation of radio apparatus. This is driven by a two-current generator with a separate low-tension battery. A low-tension generator is fitted in the leading edge of the upper starboard wing root, and is provided with its own battery and circuit, the latter being used only for navigation lighting and engine starting. On the left-hand side, against the cabin wall, there is a collapsible table and a chair for the radio operator, who can communicate vocally with the pilot. Level with the radio operator is a fire extinguisher, which is connected by pipe lines to the engines. This is operated in conjunction with the fire warning device.

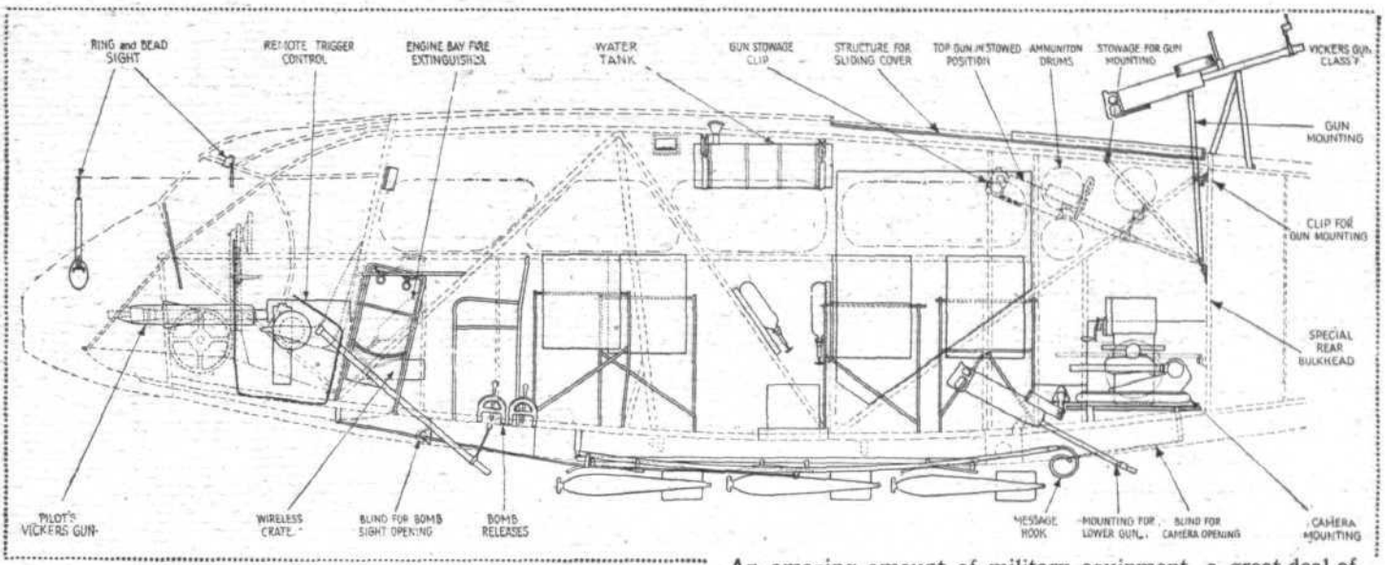
Provision is made in the middle of the fuselage for a bomb sight of the Spanish military type. A hinged lid is provided for the hole used with this sight, which is covered externally by a stout canvas roller blind, operated by a cable. To the right of the bomb sight are releases for twelve bombs of Spanish Government manufacture, weighing approximately 27lb. each. These bombs are located beneath the belly of the machine, and are arranged in three rows of four.

Slung from the roof is a five-gallon water tank, which is filled from the top right-hand leading edge. Immediately below this tank is a collapsible rack to carry the ends of four stretchers. Two of these lie in the forward end of the cabin and two in the rear end. This rack may be folded against the right-hand cabin wall, or, by releasing three spring catches, may be removed bodily. It is necessary, of course, to remove

The top and bottom rear gun positions may be seen to advantage in this view. A special guard is provided for the top mounting to protect the tail unit from damage. (*Flight* photograph.)



Twelve 27-lb. bombs are carried beneath the fuselage. The opening seen in this view is for the bomb sight. The message hook is carried on the port side of the bomb racks. (*Flight* photograph.)



An amazing amount of military equipment, a great deal of which may be seen in this diagram, is ingeniously stowed away.

Risk of damage to the tail unit by the rear top gun is eliminated by this special guard. The two rear guns are of the Vickers drum-fed pattern. (*Flight* photograph.)

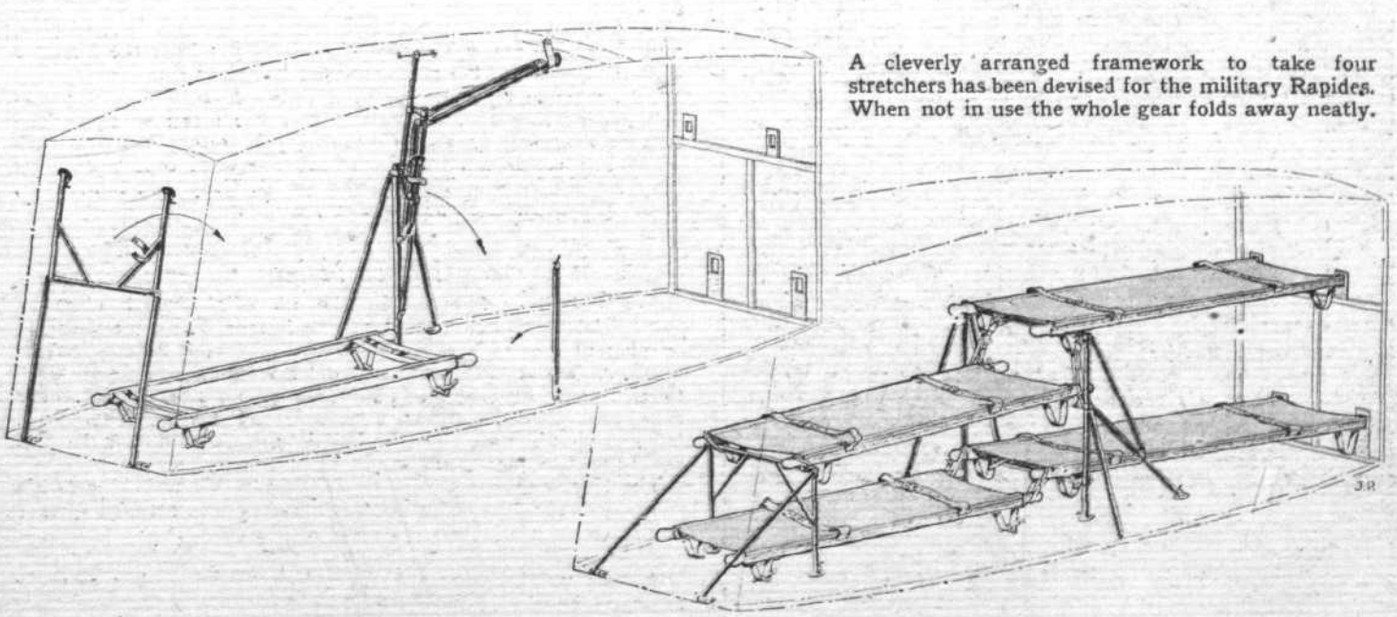
the rest of the equipment before the stretchers are fitted. If, however, the wireless set is to be operated by the pilot and the wounded do not warrant the carrying of an attendant or of a first-aid box, the wireless set may be carried with the four stretchers in position.

Provision is made at the rear of the cabin for two Vickers class "F" drum-fed machine guns, one of which fires upward through the roof, and the other downward through the floor. A guard to protect the tail unit from damage from the upper gun is fitted on top of the fuselage. The upper gun is provided with a ring which can be easily detached and made to fold back inside the cabin. The hatch is then closed by a sliding hand-operated cover. The man operating this gun is provided with safety harness, and stands on a platform which, when not in use, folds against the rear bulkhead of the cabin.

Immediately below this platform is a combined camera emplacement and the lower machine gun hatch. It is possible to use the camera for vertical or oblique photography without taking it out of its mounting. The holes in the fuselage walls for oblique photography are covered with quickly detachable spring discs.

The lower machine gunner is allowed a 30 deg. movement of his gun laterally, and approximately a 60 deg. elevation. A sliding canvas roller blind covers his hatch. Provision is made on the cabin walls for six spare drums of ammunition, and just near the door is a battery and two hand fire extinguishers. There are four folding canvas seats, apart from that of the wireless operator, for the carriage of troops or staff officers. A message hook and Very pistol are provided.

At a cruising speed of 130 m.p.h. the Spanish Rapides have an endurance of $4\frac{1}{2}$ hours, an initial rate of climb with full load of about 900 ft/min., and a ceiling on one engine of 4,000 ft.



A cleverly arranged framework to take four stretchers has been devised for the military Rapides. When not in use the whole gear folds away neatly.

MODELS

A Scaled-down "Pou" and a 15c.c. Two-stroke Engine

By M. R. KNIGHT

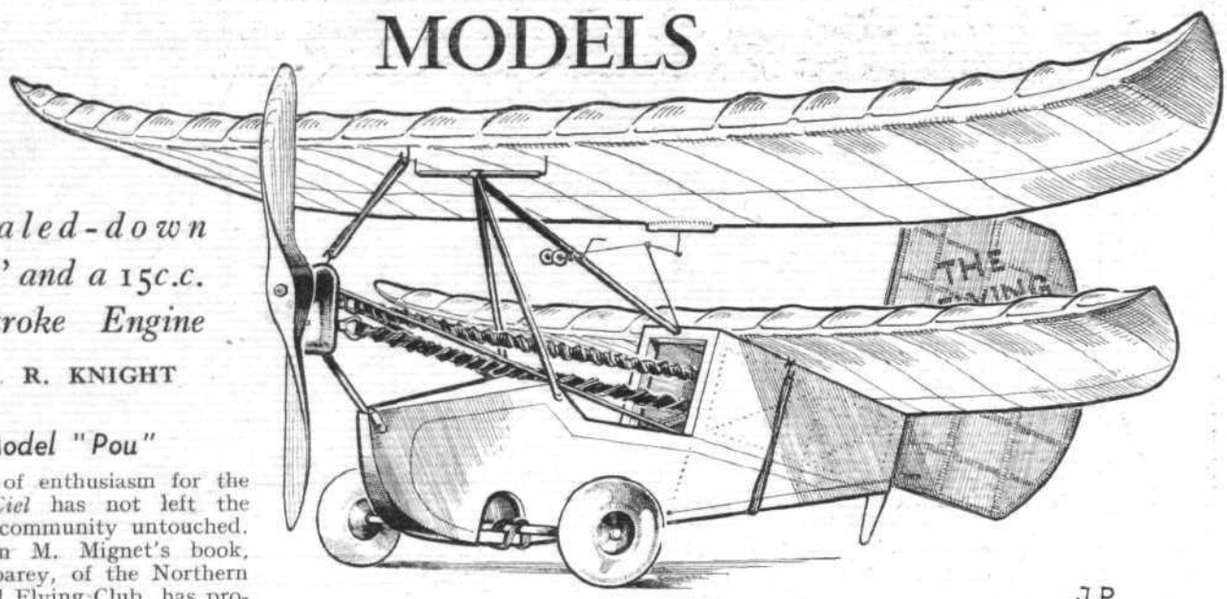
A Model "Pou"

THE wave of enthusiasm for the *Pou-du-Ciel* has not left the aeromodellist community untouched. Working from M. Mignet's book, Mr. L. H. Sparey, of the Northern Heights Model Flying Club, has produced and flown successfully a model which is practically a scaled-down *Pou*. The wing section, and even the airscrew, are true to scale, and the latter, to enable it to "deliver the goods," is geared up from the motor in the ratio of 3½ to 1. The motor consists of two skeins, each of four strands of ¼in. by $\frac{1}{16}$in. rubber strip.

The structure of the model is of balsa wood, covered with Jap tissue, the total weight being 6oz. This brings the wing loading to approximately 3oz./sq. ft. The span is 30in. The upper wing is mounted on a superstructure of fine brass tubing, and the incidence is varied by means of a tiny winch. The rudder is adjustable by means of friction on threads. The model is characterised by structural simplicity and neatness.

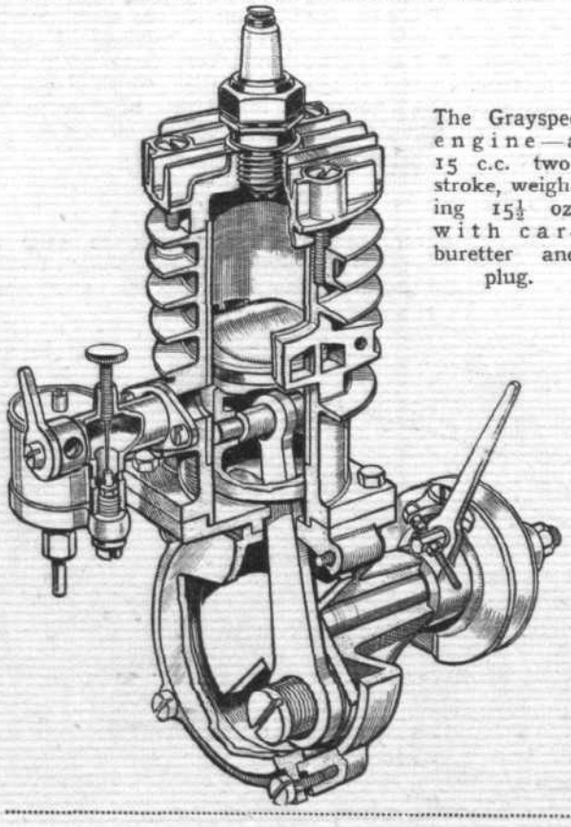
To date the duration of flight achieved is 30 seconds, which would be satisfactory for the orthodox scale model, and is a distinct achievement for a first attempt at so novel a type. Nevertheless, Mr. Sparey is confident that this figure will be bettered during the extensive tests about to be carried out. The model glides satisfactorily, at not too steep an angle, and lands in characteristic *Pou* fashion.

It is interesting to learn that a stall can be induced by setting the upper wing at an excessive angle of attack.



J.P.

Mr. L. H. Sparey's *Pou-du-Ciel*—a model exhibiting many characteristics of the original.



The Grayspec engine—a 15 c.c. two-stroke, weighing 15½ oz. with carburetter and plug.

Petrol Power

THE sectional drawing on the left shows the constructional features of a typical model aircraft petrol engine. Actually, it is the 15 c.c. Grayspec two-stroke which, it will be remembered, is the power unit of the remarkable scale model Percival Gull built by Mr. A. E. Morrod, of Coventry, and described in *Flight* of August 8, 1935.

The air-cooled cylinder, which has a bore of $1\frac{1}{16}$in. and a stroke of 1in., is cast from light alloy (as are all the other principal castings) and is fitted with a cast-iron liner. The cylinder head is detachable, and is secured by three studs; it carries a miniature Bosch sparking plug.

Of alloy, the piston has either one or two Wellworthy rings, as desired, and these are pegged to prevent the ends working round and catching in the ports. The connecting rod is of forged duralumin, bushed at both ends with phosphor bronze. In an alternative de luxe model, a roller bearing big end is fitted.

The crankshaft, which is carefully balanced, is of the overhung type, carrying at its outer extremity the airscrew boss, and a face cam to operate the coil ignition contact breaker; the latter is on a rocking mounting to enable the ignition timing to be varied as required.

The carburetter normally fitted to this engine is an ingenious little instrument having a needle-controlled fuel jet and an air supply governed by a simple finger-operated valve; a bottom-feed float chamber contains a cork float. Lubrication is by Petroil. An interesting point is that the engine will run equally well in an inverted position.

Weighing 15½ oz., the engine has an overall height of 7in., and the width across the crankcase is 2¼in.; from the airscrew boss to the rear of the crankcase the length is 4in.

The price is £3 17s. 6d. in a finished condition, the carburetter costing 18s. 6d. extra, and the airscrew 15s. The makers also supply sets of castings in either machined or unfinished condition, in which case the total cost works out considerably lower. The makers are E. Gray and Son, Ltd., 18-20, Clerkenwell Road, London, E.C.1.

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Indoor Flying

EVERYONE interested in the ultra-lightweight class of model is invited to attend the indoor flying meetings to be held in the old Horticultural Hall, Vincent Square, Westminster, under the auspices of the Model Aircraft Club (T.M.A.C.). Flying takes place from 7 to 9 p.m. on December 12, January 9, February 6 and March 12, all Thursdays. Visitors should note that the hall is unwarmed and make personal provision accordingly.

The Northern Heights Model Flying Club has held a flying meeting in the Alexandra Palace, and hopes to arrange further dates.

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A new monthly journal, *The Aero Modeller*, has recently been published. It is the official organ of the rapidly growing Skybird League.